EFFECT OF ELEVATION TO THE GAS AND OIL PIPELINE FOCUSING ON PRESSURE DROP BY USING NODAL ANALYSIS

By

MOHD SHAHNIZAM KHAIRUDDIN
11555

Dissertation submitted in partial fulfillment of
the requirements for the
Bachelor of Engineering (Hons)
(Petroleum Engineering)

JAN 2012

Universiti Teknologi PETRONAS
Bandar Seri Iskandar
31750 Tronoh
Perak Darul Ridzuan

CERTIFICATION OF APPROVAL

EFFECT OF ELEVATION TO THE GAS AND OIL PIPELINE FOCUSING ON PRESSURE DROP BY USING NODAL ANALYSIS

by

Mohd Shahnizam Khairuddin

A project dissertation submitted to the

Petroleum Engineering Program

Universiti Teknologi PETRONAS

in partial fulfillment of the requirement for the

Bachelor of Engineering (Hons)

(Petroleum Engineering)

Approved by,

_____

(AP AUNG KYAW)

UNIVERSITI TEKNOLOGI PETRONAS

TRONOH, PERAK

JAN 2012

CERTIFICATION OF ORIGINALITY

This is to certify that I, Mohd Shahnizam Khairuddin (I/C No: 890529-06-5013), am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

_____

MOHD SHAHNIZAM KHAIRUDDIN

Student ID : 11555

I/C No : 890529-06-5013

Date : 16th April 2012

ABSTRACT

Pipes appear to have been invented independently several places at nearly the same time and are known to have been in use as much as 5,000 years ago in China, Egypt, and the area presently known as Iraq. At a much later date, the Romans advanced the art of designing piping and waterworks, though the Roman Empire's fall reversed all that parameters and waterworks were largely ignored in early middle-age Europe. Towns reverted to using wells, springs, and rivers for water, and wastewater was simply disposed of into the streets. Improvements were clearly needed, and fittingly, one of the first books printed after the invention of the printing press in the fifteenth century was Frontinus' Roman treatise on waterworks. The advent of the industrial revolution accelerated the need for pipes while providing economic and technical means.

Pipes and channels have historically brought major advantages to those who had them, and successful pipeline or aqueduct projects have always required the right combination of political, economical and technical resources. History shows that most societies did not possess that combination, leaving them without advanced waterworks. Even today, a considerable part of the world's population suffers from unclean drinking water and inadequate sewage systems. The technology to solve such problems exists, but too often, poverty or economic unrest holds back the development.

In our modern world, pipelines have more applications than in previous times for example in natural gas and oil transportation. In this project, the author will focus on the effect of elevation to the pipeline system and try to understand the effect of elevation between these two types of pipeline. This research is also to try to answer this question with the aid of suitable software or experiment.

ACKNOWLEDGEMENT

Thanks to God, whom with His willing giving me the opportunity to complete this Final Year Project. First and foremost, I would like to express my deepest gratitude to my helpful supervisor AP Aung Kyaw, who has guided and support me during these two semester sessions to complete this project.

I would also want to thank all lecturers and staffs of Petroleum Engineering and Geosciences Department for their co-operations, suggestions and time responding to my inquiries along the way. Deepest thanks and appreciation to my beloved parents, Khairuddin Adam and Wan Rubyanun Wan Majid, and family for their love, support and prayers during my time completing this project.

Not to forget, to all my friends and work mate especially Ainil Izzyan Naffi and Marcus Oliver for their cooperation, encouragement, constructive suggestion and full of support for this project completion, from the beginning till the end. Thanks to everyone who has been contributing by supporting my work during the final year project progress till it is fully completed.

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1:

INTRODUCTION

1.1 BACKGROUND OF STUDY

The effect of elevation cannot be ignored in pipeline even though there are times the effect of elevation is neglected to make the calculation simpler. This is because the major variables that affect the design of pipelines for example in gas are: the projected volumes that will be transported, the required delivery pressure (subject to the requirements of the facilities at the consumer end), the estimated losses due to friction, and the elevation changes imposed by the terrain topography. Overcoming such losses will likely require higher pressure than the one available when the gas is being produced. Thus, forcing a given gas rate to pass through a pipeline will inevitably require the use of compressor stations.

This study will not only focus the effect of elevation to gas pipeline, it will also emphasis the effect on oil pipeline and multiphase pipeline and compare between these three variables. The basic idea from 'Oil & Gas Pipelines in Nontechnical Language by Thomas O. Miesner and William L.Leffler is; pressure will decline as fluids move uphill and increases as they flow downhill, but how much will they decline or increase? This is the question that needs to be studied and evaluated. Basically, this depends on the weight of the fluid and the height of the hill. The heavier the fluid, the more pressure it takes to push it up the hill.

Gas works the same way but with a significant difference. Liquids are essentially not compressible, so their density does not depend very much on pressure. Each successive cubic foot of water up the column weights the same as the one under it. But this does not work for gas. Since gas is compressible, each successive cubic foot of gas up the column is less dense than the one below. It weighs less than the one underneath.

1.2 PROBLEM STATEMENT

1.2.1 Problem identification

With the use of natural gas has been on the increase for the past three decades and current consumption is expected to double by the year 2020 based from Canadian International Petroleum Conference and the demand of oil increase at slower rate as said by OPEC, despite a global economic downturn, new oil and gas pipelines are being planned and built. *P&GJ*'s worldwide survey figures indicate 119,938 miles of pipelines are planned and under construction. Of these, 83,634 represent projects in the planning and design phase while 36,304 miles reflect pipelines in various stages of construction. The major question is: What is the effect of elevation to pipeline? This is a question need to be answer with so much uncertainty and variables that need to consider and interpret.

1.2.2 Significant of the project

Through this project, the variable that will be focused on is the pressure drop. Pressure drop plays a major role in pipeline efficiency. Based on Production Optimization Using Nodal Analysis by H. Dale Beggs, the amount of oil and gas flowing into the well from the reservoir depends on the pressure drop in the piping system. And the pressure drop in the piping system depends on the amount of fluid flowing through it.

1.3 OBJECTIVE

- To determine the effect of elevation to oil and gas pipeline systems focusing on pressure drops.
- To use sensitivity analysis to determine the best pipeline ID before making comparison.
- To use PIPESIM™ simulation output file in solving problem.

1.4 SCOPE OF STUDY

Simple pipeline systems will be used to illustrate some of the problem that is faced in injecting gas and flow the oil to piping system. These simple pipeline systems will not use any compressor or pump since the author want to know the different between single phase of gas, single phase of oil and multiphase flow in pressure drop due to elevation. Sensitivity analysis should be included to find best pipeline ID to ensure pressure drop by these factors can be demolish through each cases.

1.5 THE RELEVANCY OF PROJECT

Based on Production Optimization Using Nodal Analysis by H. Dale Beggs, the amount of oil and gas flowing into the well from the reservoir depends on the pressure drop in the piping system. And the pressure drop in the piping system depends on the amount of fluid flowing through it. In Gas Field Engineering, technically in deliverability of gas production system, pressure drop in pipeline (using Panhandle Equation or other pipeline flow equations) will affect the backward of the system start from the pipeline, compressors, gathering system, production string and reservoir. Therefore, the entire production system must be analyzed as a unit.

1.6 FEASIBILTY OF THE PROJECT

This project encompasses research and simulation work. Simulation that is available related this study is PIPESIM™ by Schlumberger. This simulation is available at Block 15 in Universiti Teknologi Petronas. This project can be done within 8 months given that everything goes well. The objective can be achieved if the procedures are accurately followed.

CHAPTER 2:

THEORY AND LITERATURE REVIEW

2.1 THEORY

Several proposed factors need to be fully understood in order to understand the design of pipeline due to pipe elevation because it has major effect on pressure for transportation purposes. The theory here will focus on elevation on gas pipeline.

In the flow of incompressible fluids such as water, the pressure required to transport a specified volume of fluid from point A to point B consists of the following components:

1. Frictional component
2. **Elevation component**
3. Pipe delivery pressure

In addition, in some cases where the pipeline elevation differences are drastic, the author must also take into account the minimum pressure in a pipeline such that vaporization of liquid does not occur. The latter results in two-phase flow in the pipeline, which causes higher pressure drop and, therefore, more pumping power requirement in addition to possible damage to pumping equipment. Thus, single-phase incompressible fluids must be pumped such that the pressure at any point in the pipeline does not drop below the vapor pressure of the liquid. When pumping gases, which are compressible fluids, the three components listed in the preceding section also contribute to the total pressure required. Even though the relationship between the total pressure required and the pipeline elevation is not straightforward (as in liquid flow), the dependency still exists and will be demonstrated using an example problem. Going back to the case of a liquid pipeline, suppose the total

pressure required to pump a given volume is 1000 psig and it is composed of the following components:

1. Frictional component = 600 psig
2. Elevation component = 300 psig
3. Delivery pressure = 100 psig

The author will now discuss each of these components that make up the total pressure required by comparing the situation between a liquid pipeline and a gas pipeline.

The elevation component is due to the difference in elevation along the pipeline that necessitates additional pressure for raising the fluid in the pipeline from one point to another. Of course, a drop in elevation will have the opposite effect of a rise in elevation.

The elevation component of 300 psig in the preceding example depends upon the static elevation difference between the beginning of the pipeline, A, and the delivery point, B, and the liquid specific gravity. In the case of a gas pipeline, the elevation component will depend upon the static elevation differences between A and B, as well as the gas gravity. However, the relationship between these parameters is more complex in a gas pipeline compared to a liquid pipeline. The rise and fall in elevations between the origin A and the terminus B have to be accounted for separately and summed up. Further, compared to a liquid, the gas gravity is several orders of magnitude lower and, hence, the influence of elevation is smaller in a pipeline that transports gas. Generally, if the author wants to break down the total pressure required in a gas pipeline into the three components discussed earlier, the author would find that the elevation component is very small. The author will illustrate this using an example based from “Gas Pipeline Hydraulics” by E. Shashi Menon.

2.2 CRITICAL ANALYSIS WITH EXAMPLE

For example, a gas pipeline, NPS 16 with 0.250 in. wall thickness, 50 mi long, transports natural gas (specific gravity=0.6 and viscosity=0.000008 lb/ft-s) at a flow rate of 100MMSCFD at an inlet temperature of 60°F. Assuming isothermal flow, calculate the inlet pressure required if the required delivery pressure at the pipeline terminus is 870 psig. The base pressure and base temperature are 14.7 psig and 60°F, respectively. Use the Colebrook equation with pipe roughness of 0.0007 in.

Case A : Consider no elevation changes along the pipeline length.

Case B : Consider elevation changes as follows: inlet elevation of 100 ft and elevation at delivery point of 450 ft, with elevation at the midpoint of 250 ft.

Solution

Inside diameter of pipe D = 16 – 2 x 0.250 = 15.5 in.

First, calculate the Reynolds number from Equation 2.34 :

$$R = 0.0004778\left(\frac{14.7}{60+460}\right)\left(\frac{0.6\times 100\times 10^6}{0.000008\times 15.5}\right) = 6{,}535{,}664$$

Next, using Colebrook Equation 2.39, calculate the friction factor as

$$\frac{1}{\sqrt{f}} = -2\mathrm{Log}_{10}\left(\frac{0.0007}{3.7\times 15.5}+\frac{2.51}{6535664\sqrt{f}}\right)$$

Solving by trial and error, the friction factor is

$$f = 0.0109$$

Therefore, the transmission factor is, using Equation 2.42,

$$F = \frac{2}{\sqrt{0.0109}} = 19.1954$$

To calculate the compressibility factor *Z*, the average pressure is required. Since the inlet pressure is unknown, calculate an approximate value of *Z* using a value of 110% of the delivery pressure for the average pressure.

The average pressure is

$$P_{avg} = 1.1 \times (870 + 14.7) = 973.17 \text{ psia}$$

Using CNGA Equation 1.34, calculate the value of the compressibility factor as

$$Z = \frac{1}{\left[1 + \left(\frac{(973.17 - 14.7) \times 344400 (10)^{1.785 \times 0.6}}{520^{3.8}25}\right)\right]} = 0.8629$$

2.2.1 CASE A (NO ELEVATION DIFFERENCE)

Since there is no elevation difference between the beginning of the pipeline and the end of the pipeline, the elevation component in Equation 2.7 can be neglected, and e^s=1.

The outlet pressure is

$$P_2 = 870 + 14.7 = 884.7 \text{ psia.}$$

From General Flow equation 2.4, substituting the given values,

$$100\times10^6 = 38.77\times19.1954\left(\frac{520}{14.7}\right)\left(\frac{P_1^2 - 884.7^2}{0.6\times520\times50\times0.8629}\right)^{0.5}(15.5)^{2.5}$$

Therefore, the upstream pressure is

$$P_1 = 999.90 \text{ psia} = 985.20 \text{ psig}$$

Using the value of P_1 , calculate the new average pressure using Equation 2.14 :

$$P_{avg} = \frac{2}{3}\left(999.9 + 884.7 - \frac{999.9\times884.7}{999.9+884.7}\right) = 943.47 \text{ psia}$$

Compared to 973.17 the author used for calculating Z. Recalculating Z using the new value of P_{avg} is

$$Z = \frac{1}{\left[1+\left(\frac{(943.47-14.7)\times344400(10)^{1.785\times0.6}}{520^{3.8}25}\right)\right]} = 0.8666$$

Comparing this value with 0.8629 calculated earlier for Z, now recalculate the inlet pressure using this value of Z. From General Equation 2.4,

$$100\times10^{6} = 38.77\times19.1954\left(\frac{520}{14.7}\right)\left(\frac{P_1^2 - 884.7^2}{0.6\times520\times50\times0.8666}\right)^{0.5}(15.5)^{2.5}$$

Solving for the upstream pressure,

$$P_1 = 1000.36 \text{ psia} = 985.66 \text{ psig}$$

This is close enough to the previously calculated value 985.20 psig, and no further iteration is needed. Therefore, the pressure required at the beginning of the pipeline in case A is 985.66 psig when the elevation difference is zero.

Pressure required is calculated by taking into account the given elevations at the beginning, midpoint, and end of the pipeline.

2.2.2 CASE B (WITH ELEVATION)

Using $Z = 0.8666$ throughout, as in case A.

Using Equation 2.10, the elevation adjustment factor is first calculated for each of the two segments. For the first segment, from milepost 0.0 to milepost 25.0, we get

$$s_1 = 0.0375 \times 0.6 \left(\frac{250 - 100}{520 \times 0.8666} \right) = 0.0075$$

Similarly, for the second segment, from milepost 25.0 to milepost 50.0,

$$s_2 = 0.0375 \times 0.6 \left(\frac{450 - 100}{520 \times 0.8666} \right) = 0.0175$$

Therefore, the adjustment for elevation is using Equation 2.12,

$$j = \frac{e^{0.0075} - 1}{0.0075} = 1.0038 \text{ for the first segment}$$

And

$$j = \frac{e^{0.0175} - 1}{0.0175} = 1.0088 \text{ for the second segment}$$

For the entire length ,

$$s_2 = 0.0375 \times 0.6 \left(\frac{450 - 100}{520 \times 0.8666} \right) = 0.0175$$

The equivalent length from equation 2.12 is then,

$$L_e = 1.0038 \times 25 + 1.0088 \times 25 \times e^{0.0075} = 50.5049 \text{ mi.}$$

Therefore, the effect of the elevation is taken into account partly by increasing the pipe length from 50 mi to 50.50 mi, approximately.

Substituting Equation 2.7,

$$100\times10^6 = 38.77\times19.1954\left(\frac{520}{14.7}\right)\left(\frac{P_1^2 - e^{0.0175}884.7^2}{0.6\times520\times50.50\times0.8666}\right)^{0.5}15.5^{2.5}$$

Solving for inlet pressure at P_1

$$P_1 = 1008.34 \text{ psia} = 993.64 \text{ psig}$$

Thus, the pressure required at the beginning of the pipeline in case B is 993.64 psig, taking into account elevation difference along the pipeline. Compare this with 985.66 calculated ignoring the elevation differences.

For simplicity, the same value of *Z* is assumed in the preceding calculations as in the previous case. For accuracy, Z value should be recalculated based on the average pressure and the calculations should be repeated until the results are within 0.1 psi. It can be seen from the preceding calculations that, due to elevation difference of 350 ft (450 ft–100 ft) between the delivery point and the beginning of the pipeline, the required pressure is approximately 8 psig (993.64 psig–985.66 psig) more. In a liquid line, oil for example, the effect of elevation would have been more significant. The elevation difference of 350 ft in a water line would result in an increased pressure of

$$350 \times 0.433 = 152 \text{ psi, approximately, at the upstream end.}$$

Based on these calculations, it can be see that elevation effect on the pressure required to transport oil or gas because of the pressure drop factor.

The equation related in previous calculation:

$$Re = 0.0004778\left(\frac{P_b}{T_b}\right)\left(\frac{GQ}{\mu D}\right) \quad \text{(USCS units)} \tag{2.34}$$

$$\frac{1}{\sqrt{f}} = -2\,\mathrm{Log}_{10}\left(\frac{e}{3.7D} + \frac{2.51}{Re\sqrt{f}}\right) \quad \text{for } Re > 4000 \tag{2.39}$$

$$F = \frac{2}{\sqrt{f}} \tag{2.42}$$

$$Z = \frac{1}{\left[1 + \left(\frac{P_{avg}\,344{,}400(10)^{1.785G}}{T_f^{3.825}}\right)\right]} \tag{1.34}$$

$$Q = 38.77\,F\left(\frac{T_b}{P_b}\right)\left(\frac{P_1^2 - e^s P_2^2}{GT_f L_e Z}\right)^{0.5} D^{2.5} \quad \text{(USCS units)} \tag{2.7}$$

$$Q = 38.77F\left(\frac{T_b}{P_b}\right)\left(\frac{P_1^2 - P_2^2}{GT_f LZ}\right)^{0.5} D^{2.5} \quad \text{(USCS units)} \tag{2.4}$$

$$P_{avg} = \frac{2}{3}\left(P_1 + P_2 - \frac{P_1 P_2}{P_1 + P_2} \right) \tag{2.14}$$

$$s = 0.0375G\left(\frac{H_2 - H_1}{T_f Z} \right) \quad \text{(USCS units)} \tag{2.10}$$

$$j = \frac{e^s - 1}{s} \tag{2.12}$$

$$L_e = j_1 L_1 + j_2 L_2 e^{s1} + j_3 L_3 e^{s2} + \cdots \tag{2.13}$$

USCS: United States Customary Units

CNGA: California Natural Gas Association

2.3 LITERATURE REVIEW

Elevation has a large effect on pressure within the pipeline. It must be factored in when determining equipment(s) specific location and discharge pressures to move the product in a flat pipeline, or in a pipeline with a rise or drop in elevation.

Based on Oil & Gas Pipelines in Nontechnical Language by Thomas O. Miesner, pipeline designer cannot avoid the effect of elevation to their pipeline system. Technically pipeline is not a straight line between two points. In reality, pipeline designers normally work with multiple receipt and delivery points, all located along something that hardly looks like a straight line. Pipeline designers balance many factors as they search for the safest, economic, environmentally and politically friendly route that can be permitted and constructed. Many of the items are external to the engineering aspects of the new line:

- Existing utility corridors
- Geography (offshore, onshore, subsea)
- Population centers and populated areas
- Future development plans and land use planning
- Major crossings (road, rail board ,sea ,river ,stream)
- Environmentally sensitive areas (wetlands, endangered species)
- Sensitive areas(archeological, cultural and paleontological)
- Steep slopes
- Earthquakes and fault zones
- Government lands

Taking into account all these factors, pipeline designers can expect thousands of elevation point change in their pipeline system and the effect of pressure drop will appear in this pipeline system naturally.

Based on ‘Distribution Piping: Understanding Pressure Drop’ by Compressed Air Challenge, excessive pressure drop will result in poor system performance and excessive energy consumption. Flows restrictions of any type in a system require higher operating pressures than are needed, resulting in higher energy consumption. The particular pressure rise resulting from resistance to flow can involve increasing the drive energy on the compressor by 1% of the connected power for each 2 psi of differential.

H. Dale Beggs stated in his ‘Production Optimization Using Nodal Analysis’ that the final design of a production system cannot be separated into reservoir performance and piping system performance and handled independently. The amount of oil and gas flowing into the well from the reservoir depends on the pressure drop in the piping system and the pressure drop in the piping system depends on the amount of fluid flowing through it. Therefore, the entire production system must be analyzed as a unit.

Donald F.B Jackson stated that in single phase flowing conditions, the effect of elevation on pressure loss calculations is generally limited to the net elevation change between the start and end of the pipeline. For gas pipelines, the elevation profile affects the in situ pressure, and hence the gas velocity and frictional pressure losses. The low density of natural gas mitigates the effect of hydrostatic head on the in situ pressure, and for most systems, the elevation profile has only minimal impact on the total pressure loss. The effect of the elevation profile on pressure losses in a multiphase pipeline is much more significant. He tried to compare this to single phase gas since the existence of single phase black oil is nearly zero nowadays. In multiphase flow, the different velocities of the gas and liquid phases create a gas liquid slip condition in which the denser liquid phase tends to accumulate in the uphill sections of the pipeline. This accumulation of liquid reduces the area for flow for the gas phase, which increases its velocity until an equilibrium condition is reached. At this steady state condition, the volume of liquid lifted up the hill is equal to the volume of liquid arriving at the base of the hill.

In Petroleum Engineering Handbook for the practicing engineer, Volume 1, by Mohammed A. Milan, pressure drop plays a role in calculation of deliverability of a gas production system starting from the pipeline and it works backward to compressors calculations, gathering system calculations, production string and reservoir. In the end, the pipeline capacity will affect the total system and result in maximum system deliverability for gas.

In Handbook of Flow Metering by Corneliussen Sidesel (et. al) stated that multiphase flow is a difficult component comparing to single phase metering. Multiphase flow measurement is a catch all term that describes multiple fluid components in a flowing stream. For instance, water and oil are considered to be multiphase in the oil and gas industry, even though they are both liquids. Slurries are truly multiphase because there are liquid and solid components. Usually, multiphase measurements that are made up of multiple liquid components or slurries are “easy” to measure. This is because the fluid is homogenous and it behaves as if it is a single component. Difficult multiphase measurements usually involve a liquid and a gas, such as water and air. Measurement difficulties arise because the gas tends to separate from the liquid, creating a non homogenous fluid.

Flat Pipeline

In a flat pipeline, the pressure needed to deliver the product is based on the delivery point requirements and the pressure drop within the pipeline. Final delivery point pressure takes into consideration such things as storage tank pressure requirements.

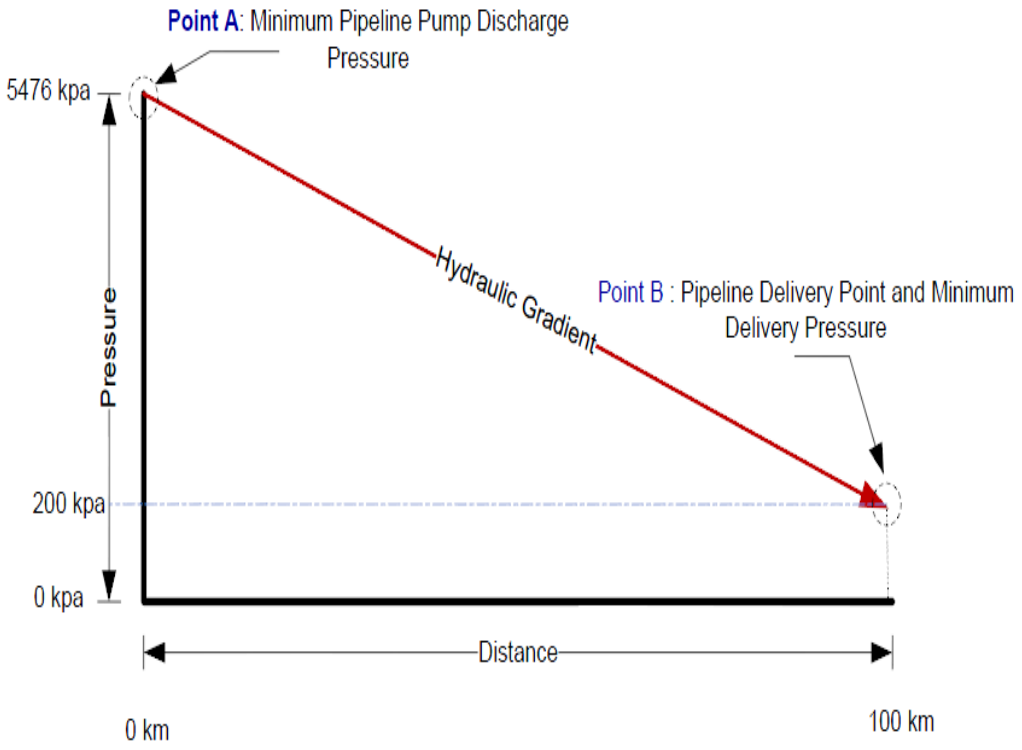


Figure 1: Flat Elevation – Red Line Represents Pressure Drop

Increasing Elevation

As with a flat elevation, pressure requirements within an increased elevation pipeline are determined based on the final delivery point requirements. Within elevation changes there may be peaks that must be taken into consideration especially if the liquid is susceptible to change of state (liquid to gas) due to its vapor pressure. LPG and gasoline products would be examples of liquids susceptible to change of state. At

the top of the peak the pressure must be calculated to determine the product pressure at that point to ensure that it is above its vapor pressure point. If it is below its vapor pressure value, liquid may change into its gaseous form which will stay at the highest point of the pipeline (the peak). This would cause a reduction in flow since some of the liquid space is now occupied by gas. In addition it may cause two phase flow (liquid and gas) or possibly a vapor lock in the pipeline which would prevent any liquid from flowing. Pipeline pumps must be sized and operated correctly to prevent a two phase condition.

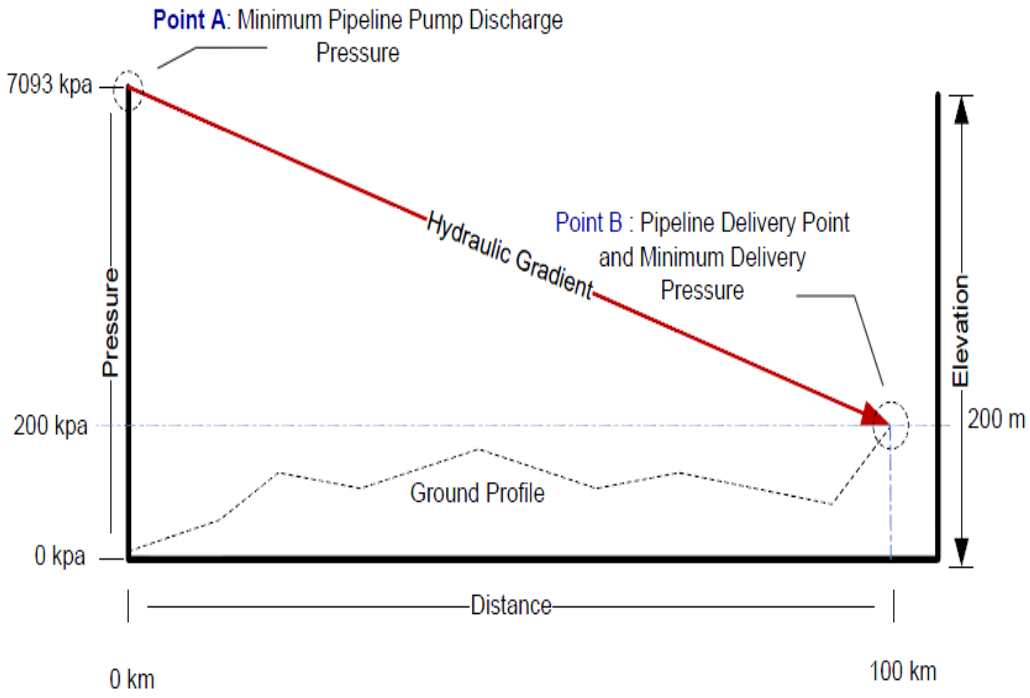


Figure 2: Increasing Elevation – Red Line Represents Pressure Drop

Decreasing Elevation

Consider a pipeline like the one shown in Figure 3 with a high peak between point A (pump discharge) and point B (delivery point). Point C, the peak, is the highest point in the pipeline, therefore the pressure at point A must be sufficient enough to:

- overcome the pipeline friction losses
- overcome the pressure head between A and C, and
- Maintain the pressure at the peak C to keep the product (if liquid) above its vapor pressure point.

Once the liquid reaches the top of the peak it will now flows down the other side of the peak to point B and increases in liquid head pressure. The pressure loss due to friction counteracts any increases in liquid head pressure because it is flowing downhill.

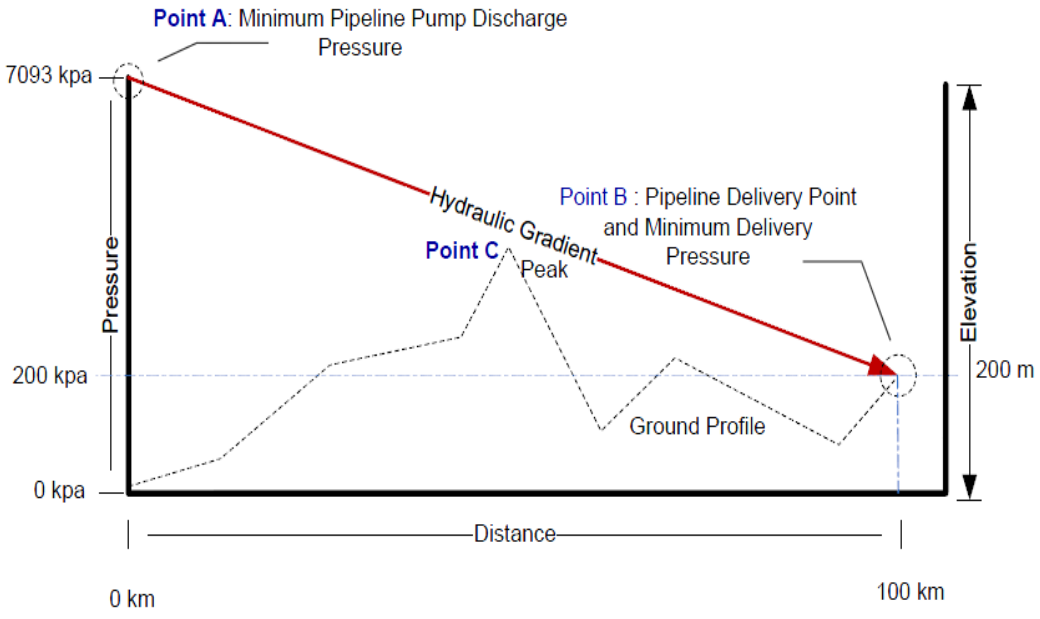


Figure 3: Decreasing Elevation – Red Line Represents Pressure Drop

In the example before, if head pressure developed by the elevation drop is significantly higher than the pressure drop due to friction, the pressure at point B may need to be controlled by a Pressure Control Valve (PCV). This will allow the product pressure to be controlled at point B and maintain a packed (or completely full) pipeline upstream of the PCV. This creates back pressure and prevents a slack line condition from occurring, shown in Figure 4. Slack line or open channel flow is a term which describes that the liquid is free flowing. Liquid in this type of flow condition may go into 2-phase flow as compared to a solid packed line. In petroleum product pipelines, there is generally pressure control at the delivery point (point B) to ensure that liquid flow is controlled. The PCV changes the hydraulic gradient by artificially raising it to make the liquid stable and prevent a 2-phase condition occurring.

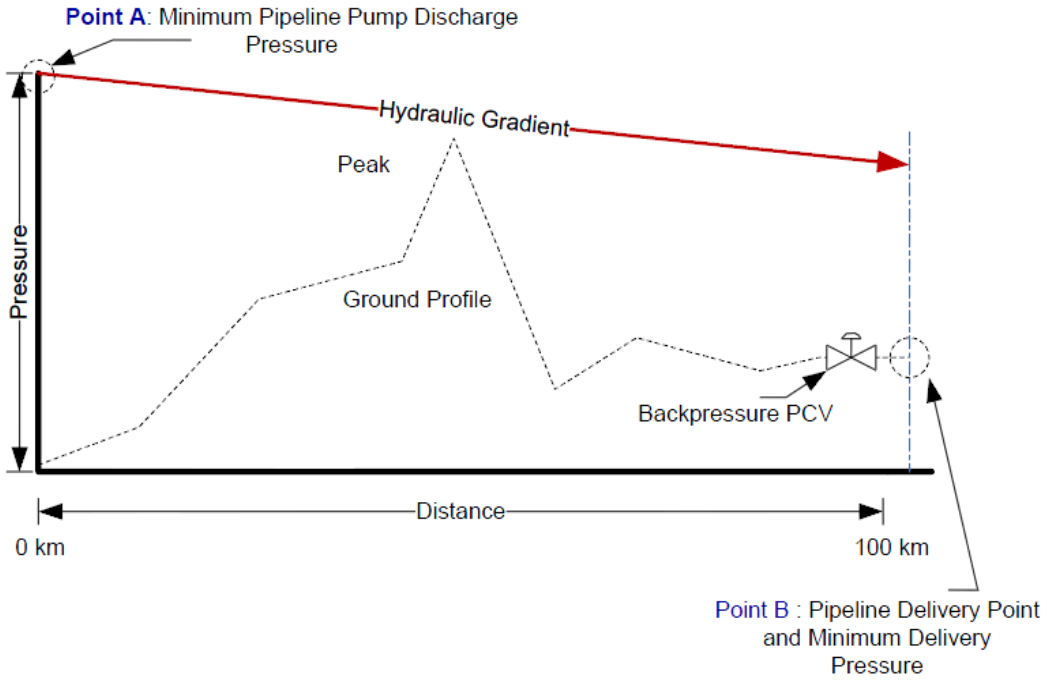


Figure 4: Decreasing Elevation with Back Pressure Control – Red Line Represents Pressure Drop

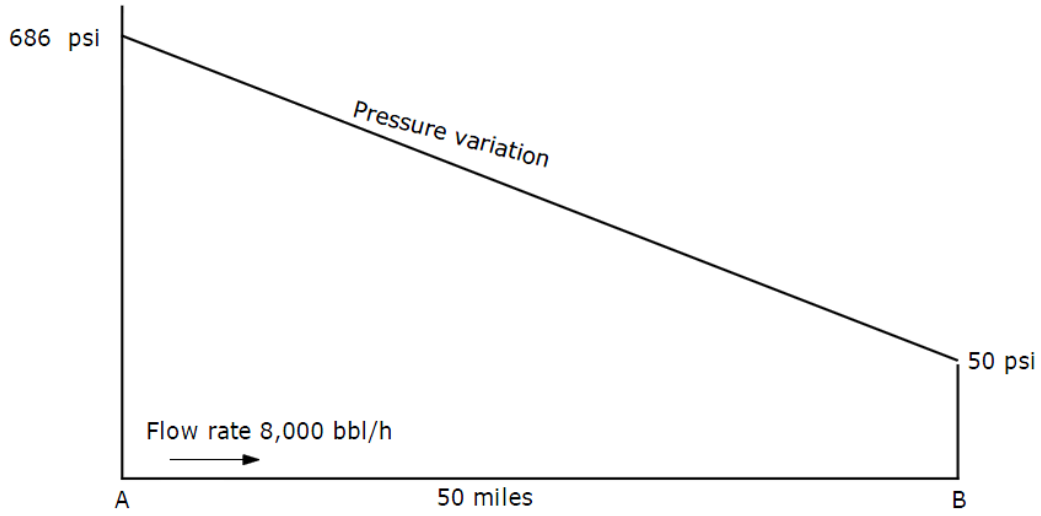


Figure 5: Pressure variation

If this pipeline transporting diesel at a flow rate of 8,000 bbl/h the pressure drop due to friction was 12.72 psi/mi. If the pipeline were 50 miles long, the total pressure drop due to friction will be

$$12.72 \times 50 = 636 \text{ psi.}$$

Suppose the buried pipeline originates at Point A and terminates at Point B, 50 miles away. Assume the delivered product at Point B is required to be at an minimum pressure of 50 psi to account for pressure drop in the delivery tank farm and for the tank head. If the ground elevation is essentially flat, the total pressure required at A, the origin of the pipeline, is 636 + 50 = 686 psi. The pressure of 686 psi at A will decrease to 50 psi at B due to the friction in the 50 mile length of pipe as shown in Figure 5. If the ground profile were not flat, and the pipeline elevation at A is 100 ft and that at B is 500 ft, additional pressure is needed at A to overcome the elevation difference of (500-100) ft. Using the head to pressure conversion equation, the 400 ft elevation difference translates to 400 x 0.85/2.31 ($h = p\ 2.31 / \text{SG}$) or 147.2 psi, considering the specific gravity of diesel as 0.85. This elevation component of 147.2 psi must then be added to the 686 psi resulting in a total pressure of 833.2 psi at A in

order to deliver the diesel at the terminus B at 50 psi pressure. This is illustrated in Figure 6.

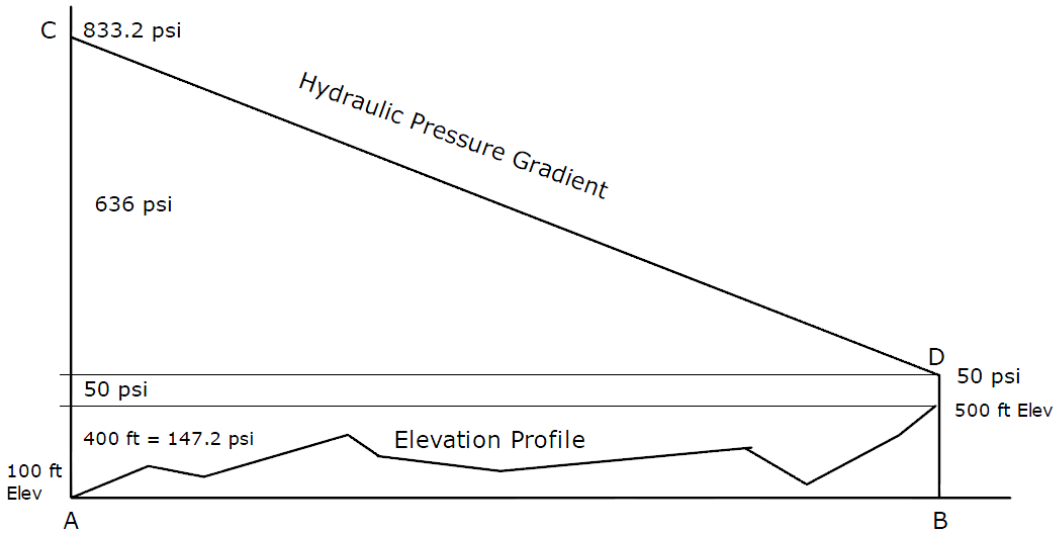


Figure 6 : Components of total pressure

Thus we conclude that the total pressure required to transport a liquid from Point A to Point B consist of three different components

1. Friction Head
2. **Elevation Head**
3. Minimum Delivery Pressure

A graphical representation of the pressure variation along the pipeline from Point A to Point B is depicted in Figure 6 and is known as the Hydraulic pressure gradient, or simply the hydraulic gradient.

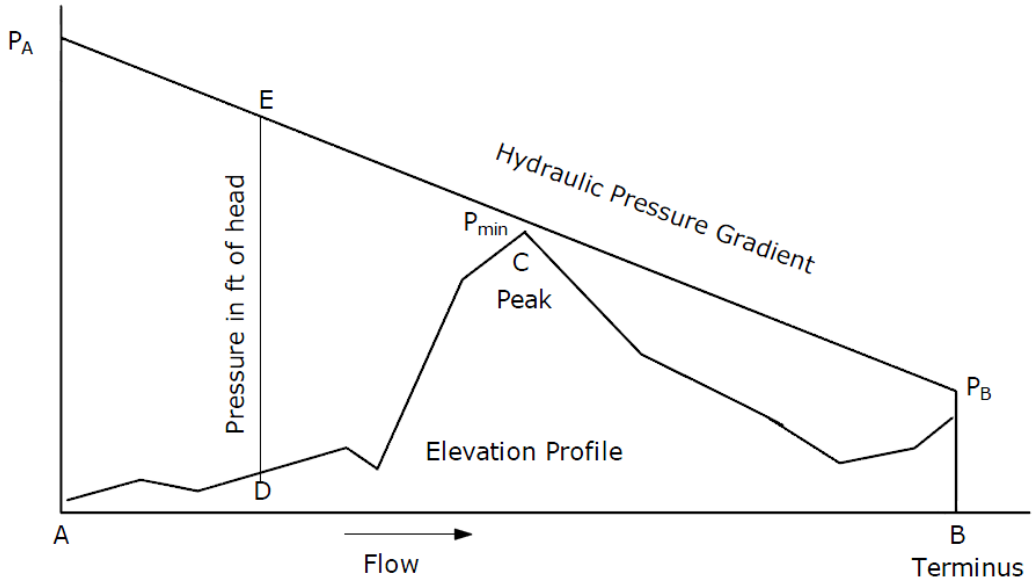


Figure 7 : Hydraulic Pressure Gradient with peak

Since the liquid pressure in the pipeline is shown along with the pipe elevation profile, it is customary to plot the pressures in ft of liquid head instead of pressure in psi. At any point along the pipeline, the liquid pressure is represented by the vertical intercept between the hydraulic gradient and the pipeline elevation at that point. This is shown as E-D in Figure 7. Of course, the pressure E-D is in ft of liquid head and can be converted to psi, using the specific gravity of the liquid.

In addition to the elevation difference between the origin A and the terminus B, there may be many elevation changes along the pipeline, with peaks and valleys. In this case, we must also ensure that the liquid pressure in the pipeline at any location does not fall below zero (or some minimum value) at the highest elevation points. This is illustrated in Figure 7 where the peak in pipeline elevation at C shows the minimum pressure P_{min} to be maintained. The minimum pressure to be maintained depends upon the vapor pressure of the liquid at the flowing temperature. For water, crude oils and refined petroleum products, since vapor pressures are fairly low and we are dealing with gauge pressures, zero gauge pressure (14.7 psia) at the high points can be allowed. However, most companies prefer some non zero gauge pressure at the

high points such as 10 to 20 psig. For highly volatile liquids with high vapor pressures such as LPG or propane, the minimum pressure along the pipeline must be maintained at some value such as 200 to 250 psig to prevent vaporization and consequent two-phase flow. As the liquid flows through the pipeline, its pressure decreases due to friction. The pressure also increases or decreases depending upon the elevation change along the pipeline profile. At some point such as C in Figure 7, the elevation is quite high and therefore the pressure in the pipeline has dropped to a small value (P_{min}) indicated by the vertical intercept between the hydraulic gradient and the pipeline elevation at point C. If the pressure at C drops below the specified minimum pressure for the liquid pumped, vaporization of the liquid occurs and results in an undesirable situation in liquid flow. Two-phase flow damages the pump impellers and must be avoided.

CHAPTER 3:

METHODOLOGY

3.1 RESEARCH METHODOLOGY

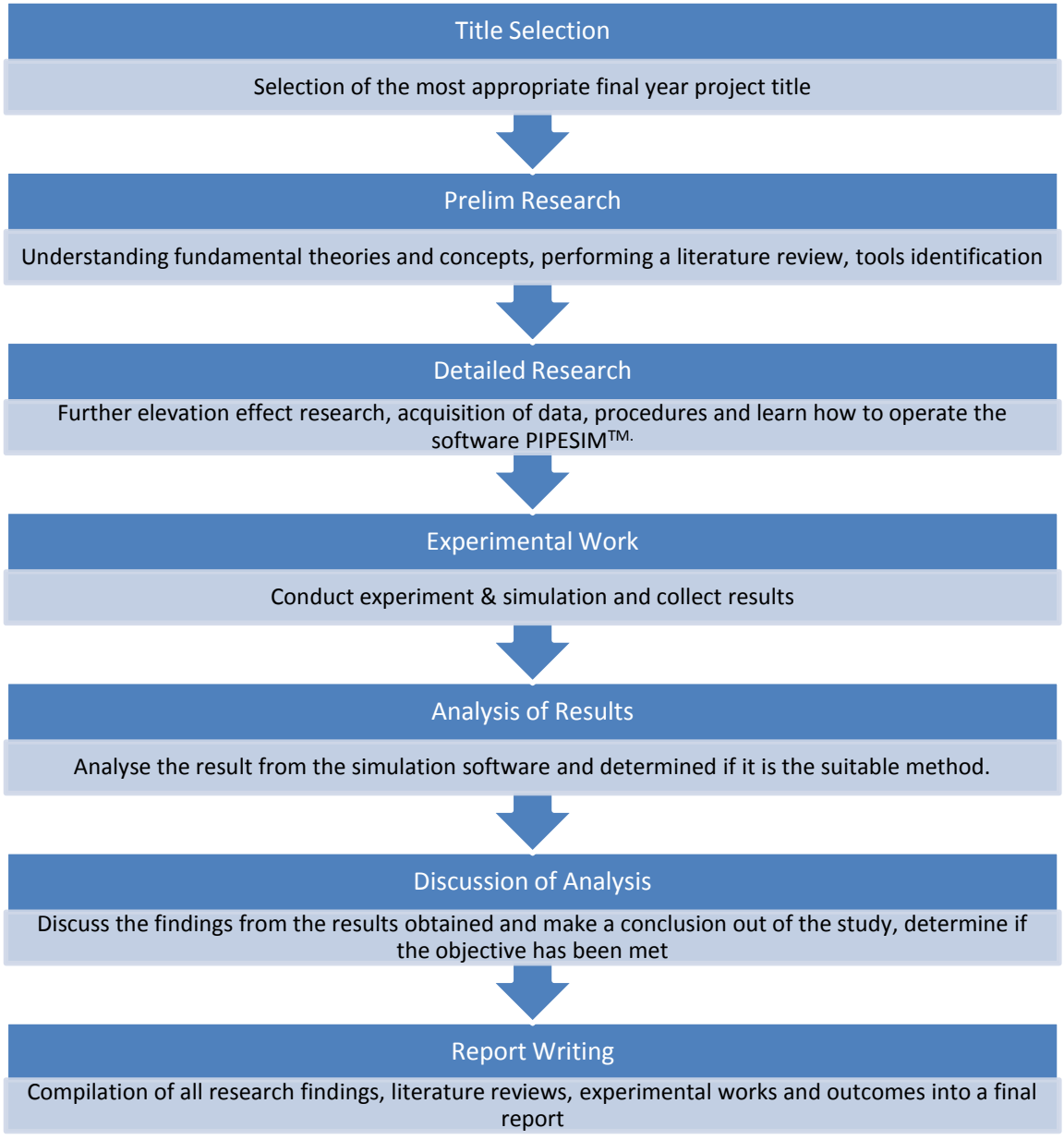


Figure 8: Research Methodology

3.2 GANTT CHART

Activities	Final Year Project I (FYP-1)														Final Year Project II (FYP-2)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Study on pipeline and configuration																												
Study on suitable software or simulation for pipeline and elevation effect																												
Data collection and assumption																												
Evaluation of data in software and simulation																												
Finalize the elevation effect																												
Data collection and interpretation																												
Comparison against oil pipeline, multiphase pipeline																												
Milestone	Final Year Project I (FYP-1)														Final Year Project II (FYP-2)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Completion of study in elevation effect																												
Completion of study in simulation or software																												
Evaluation of data in software and simulation																												
Comparison against the oil pipeline , multiphase pipeline																												

3.3 TOOLS: PIPESIM™ NODAL ANALYSIS SOFTWARE

In Universiti Teknologi PETRONAS, simulation software available in Block 15 regarding pipeline and facilities is PIPESIM™ by Schlumberger. Based on Schlumberger information and review, PIPESIM™ is a comprehensive multiphase flow model with "System Analysis" capabilities. Typical applications of module include:

- multiphase flow in flowlines and pipelines
- point by point generation of pressure and temperature profiles
- calculation of heat transfer coefficients
- flowline and equipment performance modeling (system analysis)

In facilities modeling, PIPESIM™ can also be used to design systems by varying key system parameters, thus enabling optimal pipeline and equipment sizes to be determined. PIPESIM™ use algorithm concept in solving problem. PIPESIM™ was chosen because the experimental work will expect to have large percentage of error in comparing pressure drop difference between single phase and multiphase. Plus, the limitation of lab equipment to model long distance pipeline is another barrier for the author.

CHAPTER 4:
RESULT AND DISCUSSION

Simple pipeline system was used to model the effect of elevation to the pressure drop without involving compressor or pump with different elevation to the different type of pipeline, gas pipeline, oil pipeline and multiphase pipeline. Experimental data was used for the composition of oil in the pipeline and gas in the pipeline. For multiphase flow, it was assumed that the flow rate is in stb/day and Gas Oil Ratio (GOR) is 565 scf/stb. The details for the simple pipeline model are:

Distance of the pipeline: 50 miles

Elevation: -1300 feet, 0 feet (no elevation), +1300 feet

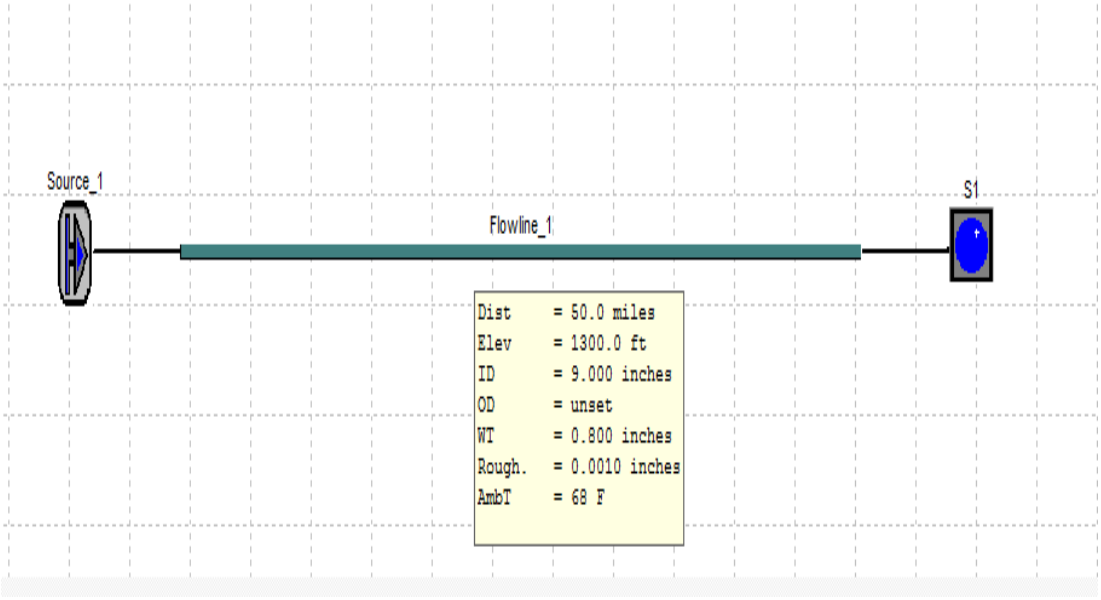


Figure 9 : Simple pipeline schematic

4.1 SENSITIVITY ANALYSIS

Sensitivity analysis is the study of how the uncertainty in the output of a model. For example, pipeline ID can be apportioned to different sources of uncertainty in the model input, pressure drop in this case. A related practice is uncertainty analysis which focuses rather on quantifying uncertainty in model output. Ideally, uncertainty and sensitivity analysis should be run in tandem. Constant value of pipeline ID cannot be used before making the comparison of pressure drop due to elevation among three types of flow because the pressure drop of the fluids through the pipeline is different when the parameters such as pipeline ID changes. When the pipeline size decreases, there will be more pressure drop because of the more friction between the fluids and pipeline wall. This sensitivity analysis is to demolish this effect by setting allowable percentage of pressure drop by each parameter for each case.

To select the best pipeline parameters for each case, sensitivity analysis is modeled using PIPESIM™. The parameter that needs to be evaluated is pipeline ID for each types of flow. Sensitivity analysis is important so that the parameter will not affect the pressure drop too much. Hence, allowable percentage of pressure drop by pipeline ID parameter is set to be less than 5% for each type of flow and this sensitivity analysis is tested at 0 feet of elevation.

To evaluate the effect of elevation to pressure drop, the effect of friction on pressure drop is set within certain since these two components are major factors of pressure drop in oil and gas pipeline. To demolish the effect of friction so that only effect of elevation alone on pressure drops can be measured, friction effect is set within range by setting the value for each 0.5 miles of pipeline, the range of pressure drop due to friction is between 0.62 psi to 0.66 psi tested at 0 feet of elevation.

4.1.1 Sensitivity analysis for pipeline ID (single phase black oil)

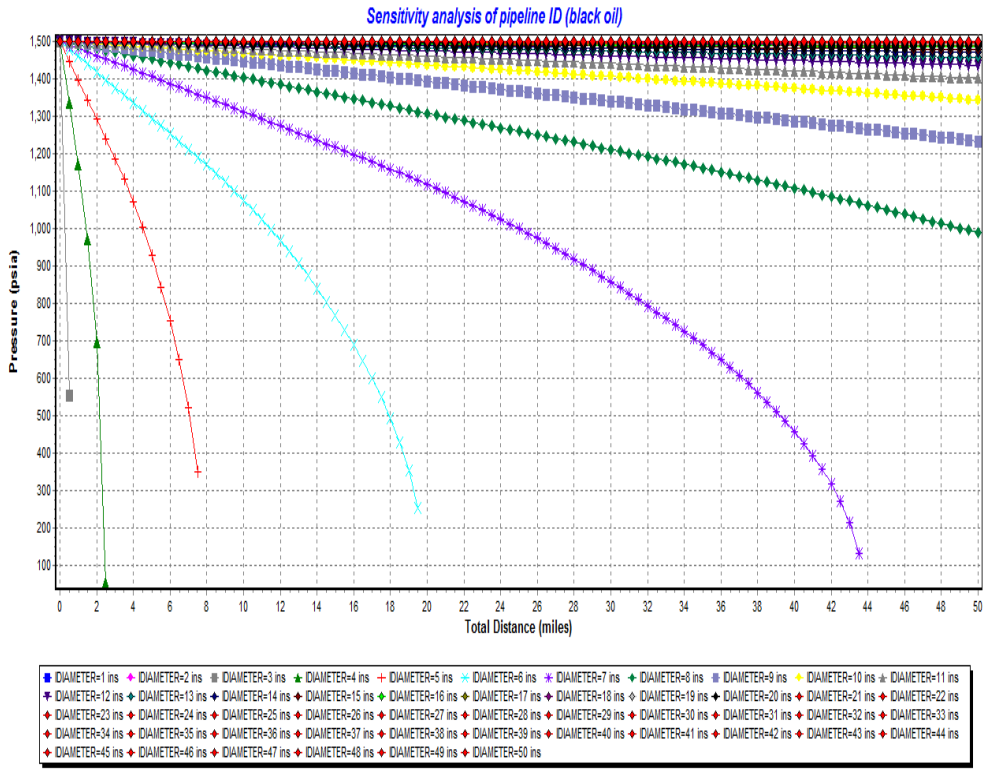


Figure 10: Single phase black oil pipeline ID sensitivity analysis

Based on this sensitivity analysis graph and data table on the next page, the author selected the pipeline ID 12 inches for single phase black oil where the pressure drop is 4.266% which is less than 5% allowable pressure drop cause by pipeline ID.

Total Distance (miles)	Pressure (psia)	Total Distance (miles)	Pressure (psia)	Total Distance (miles)	Pressure (psia)
IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins
0	1500.009	16.5	1479.029	33.5	1457.399
0	1500.009	17	1478.389	34	1456.759
0.5	1499.369	17.5	1477.759	34.5	1456.129
1	1498.739	18	1477.119	35	1455.489
1.5	1498.099	18.5	1476.489	35.5	1454.849
2	1497.469	19	1475.849	36	1454.219
2.5	1496.829	19.5	1475.209	36.5	1453.579
3	1496.199	20	1474.579	37	1452.949
3.5	1495.559	20.5	1473.939	37.5	1452.309
4	1494.919	21	1473.299	38	1451.669
4.5	1494.289	21.5	1472.669	38.5	1451.039
5	1493.649	22	1472.029	39	1450.399
5.5	1493.019	22.5	1471.399	39.5	1449.759
6	1492.379	23	1470.759	40	1449.129
6.5	1491.749	23.5	1470.119	40.5	1448.489
7	1491.109	24	1469.489	41	1447.859
7.5	1490.469	24.5	1468.849	41.5	1447.219
8	1489.839	25	1468.209	42	1446.579
8.5	1489.199	25.5	1467.579	42.5	1445.949
9	1488.569	26	1466.939	43	1445.309
9.5	1487.929	26.5	1466.309	43.5	1444.669
10	1487.299	27	1465.669	44	1444.039
10.5	1486.659	27.5	1465.029	44.5	1443.399
11	1486.019	28	1464.399	45	1442.769
11.5	1485.389	28.5	1463.759	45.5	1442.129
12	1484.749	29	1463.129	46	1441.489
12.5	1484.119	29.5	1462.489	46.5	1440.859
13	1483.479	30	1461.849	47	1440.219
13.5	1482.839	30.5	1461.219	47.5	1439.579
14	1482.209	31	1460.579	48	1438.949
14.5	1481.569	31.5	1459.939	48.5	1438.309
15	1480.939	32	1459.309	49	1437.679
15.5	1480.299	32.5	1458.669	49.5	1437.039
16	1479.669	33	1458.039	50	1436.399

Table 1: Sensitivity analysis table on 12 inch pipeline

4.1.2 Sensitivity analysis for pipeline ID (single phase gas)

Based on sensitivity analysis graph on **APPENDIX 1** and data table on **APPENDIX 2**, the author selected pipeline ID 9 inches for single phase gas where the pressure drop is 2.56% which is less than 5% allowable pressure drop cause by pipeline ID.

4.1.3 Sensitivity analysis for pipeline ID (multiphase flow)

Based on sensitivity graph on **APPENDIX 3** and data table on **APPENDIX 4**, the author selected pipeline ID 12 inches for multiphase flow where the pressure drop is 1.806% which is less than 5% allowable pressure drop cause by pipeline ID.

After conducting the sensitivity analysis for pipeline ID and select the best pipeline ID for each types of flow, it was found that the pressure drop due to friction is between 0.62 psi to 0.65 psi per 0.5 miles which is a good result to separate the pressure drop due to friction effect and the pressure drop due the elevation effect since the highest difference of friction value among these three types of flow is approximately only at 4.6 %. The elevation is then varied between 0 feet of elevation (no elevation), +1300 feet of elevation and -1300ft to each single phase black oil flow, single phase gas flow and multiphase flow before calculating the pressure drop change only due to elevation effect.

4.2 REGULATING THE FRICTION FACTOR

4.2.1 Single phase black oil

Friction factor is 0.63 is between the range. Refer **APPENDIX 5.**

4.2.2 Single phase gas

Friction factor is 0.62-0.63 is between the ranges. Refer **APPENDIX 6.**

4.2.3 Multiphase flow

Friction factor is 0.63-0.64 is between the ranges. Refer **APPENDIX 7.**

At 0 feet elevation

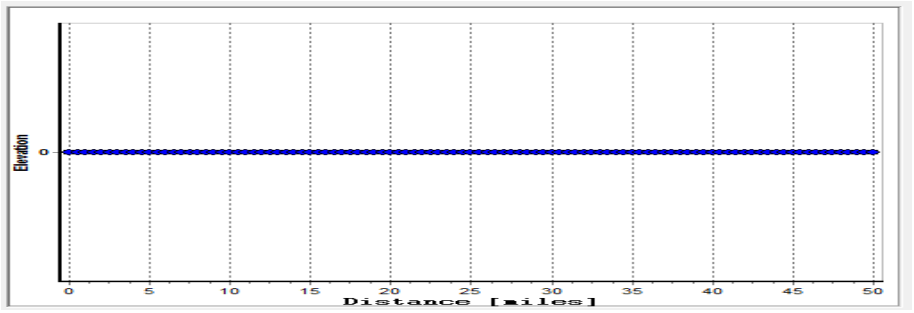


Figure 11: PIPESIM™ schematic for 0 feet of elevation

At +1300feet of elevation

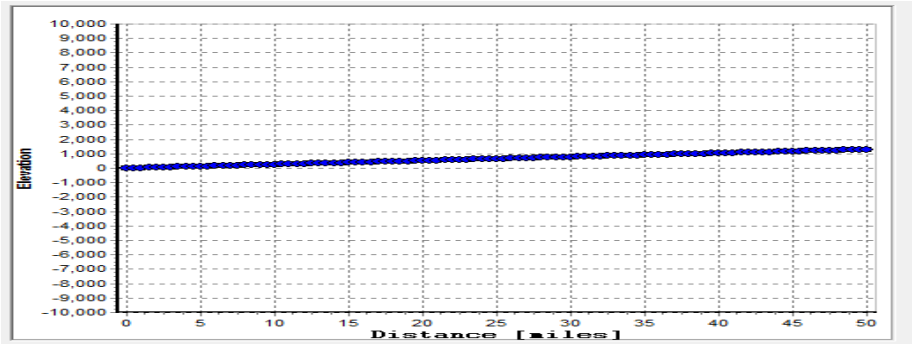


Figure 12: PIPESIM™ schematic for +1300 feet of elevation

At -1300feet of elevation

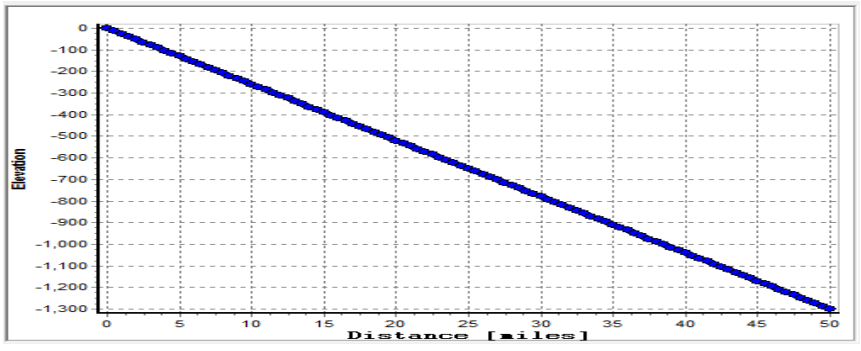


Figure 13: PIPESIM™ schematic for -1300 feet of elevation

4.3 RESULT

Based on **APPENDIX 8** to **APPENDIX 16**, the result of calculation on percentage of pressure drop due to elevation can be summarized in table below.

Table 2 : Percentage change due to elevation at different types of flow

Type of flow	Elevation (feet)	APPENDIX	Pressure at start (psi)	Pressure at end (psi)	Total pressure change (psi)	Total percentage change (%)	Pressure change due to elevation (psi)	Percentage change due to elevation (%)
Single phase black oil	0	**8**	1500	1436.4	-63.6	4.24%	0	**0%**
	+1300	**11**	1500	1103.9	-396.1	26.4%	348.644	**-23.24%**
	-1300	**14**	1500	1771.9	+271.9	18.12%	301.4	**+20.09%**
Single phase gas	0	**9**	2500	2436.8	-63.2	2.528%	0	**0%**
	+1300	**12**	2500	2331.8	-168.2	6.728%	104.33	**-4.17%**
	-1300	**15**	2500	2543.9	+43.9	1.756%	106.6	**+4.264%**
Multiphase	0	**10**	3600	3536.2	-63.8	1.77%	0	**0%**
	+1300	**13**	3600	3055	-545	15.13%	479.63	**-13.32%**
	-1300	**16**	3600	3925	+325	9.027%	400.4	**+11.12%**

4.4 TEST ON ACTUAL SCHEMATIC OF PIPELINE IN OIL AND GAS PIPELINE IN SAHARA

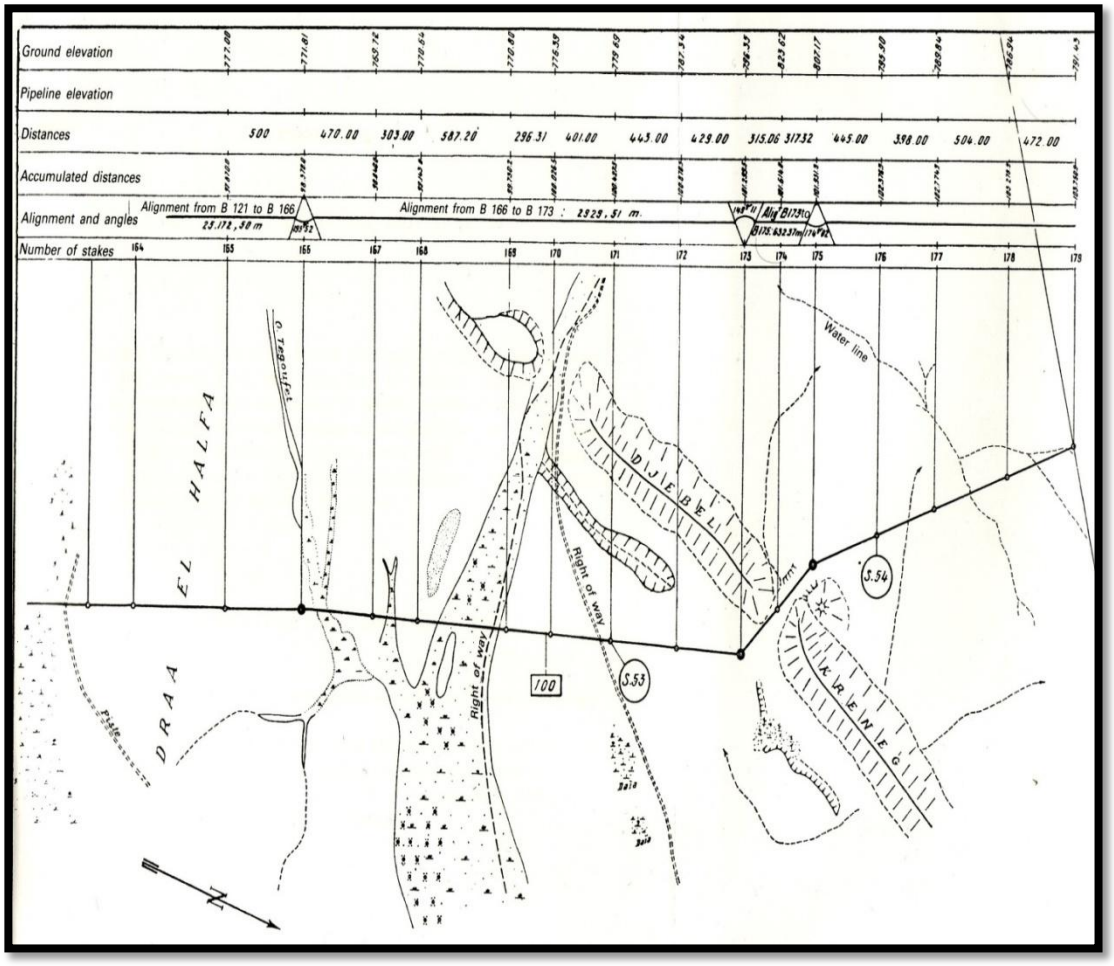


Figure 14: Oil and gas pipeline drawing in Sahara

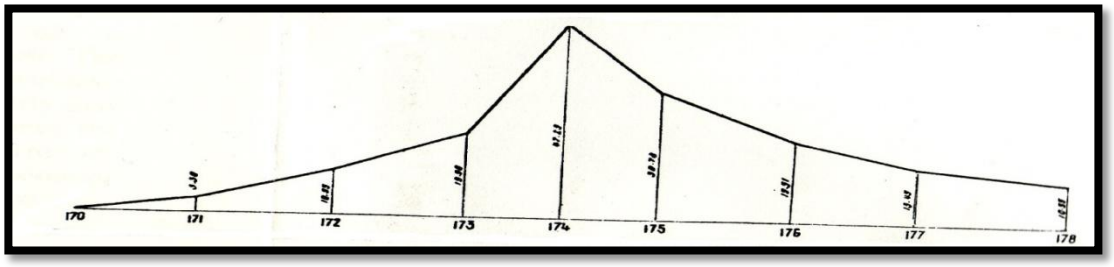
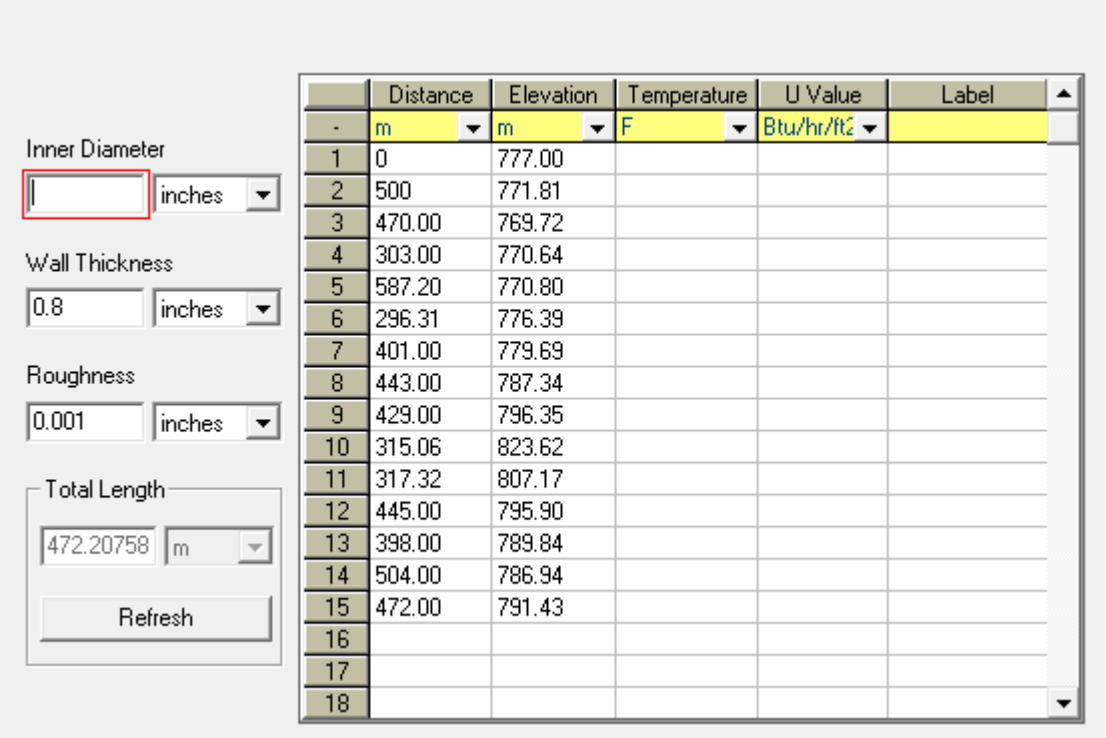


Figure 15: Oil and gas elevation schematic in Sahara (refer above)

Modeling the actual case Sahara pipeline (15 nodes)



	Distance	Elevation	Temperature	U Value	Label
-	m	m	F	Btu/hr/ft2	
1	0	777.00			
2	500	771.81			
3	470.00	769.72			
4	303.00	770.64			
5	587.20	770.80			
6	296.31	776.39			
7	401.00	779.69			
8	443.00	787.34			
9	429.00	796.35			
10	315.06	823.62			
11	317.32	807.17			
12	445.00	795.90			
13	398.00	789.84			
14	504.00	786.94			
15	472.00	791.43			
16					
17					
18					

Figure 16 : Modeling Sahara oil gas pipeline

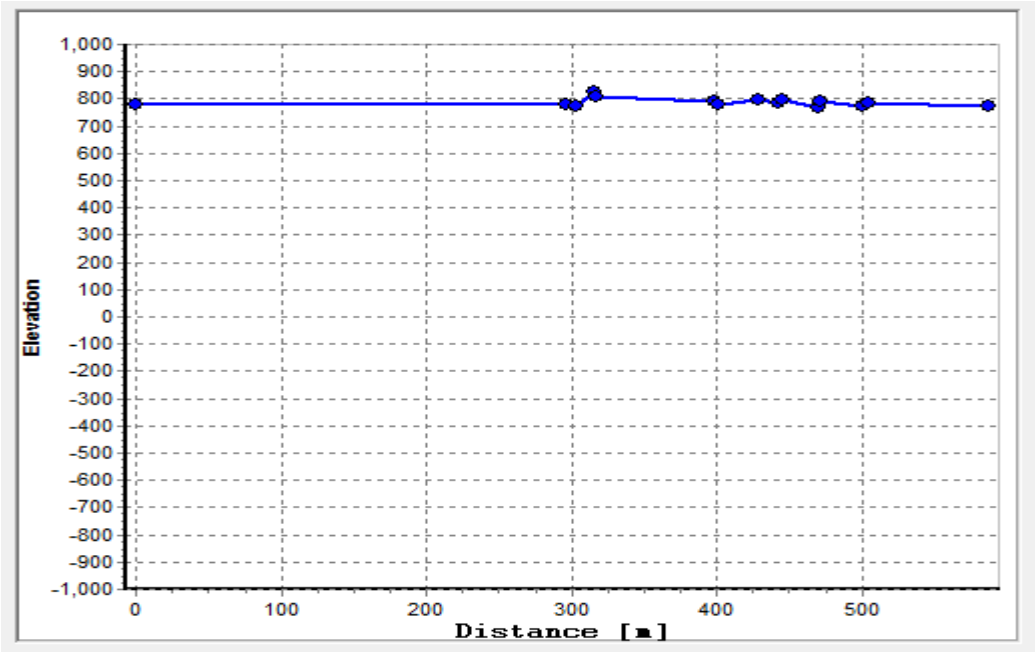


Figure 17 : PIPESIM™ schematic on Sahara oil gas pipeline

Single phase black oil on Sahara pipeline case

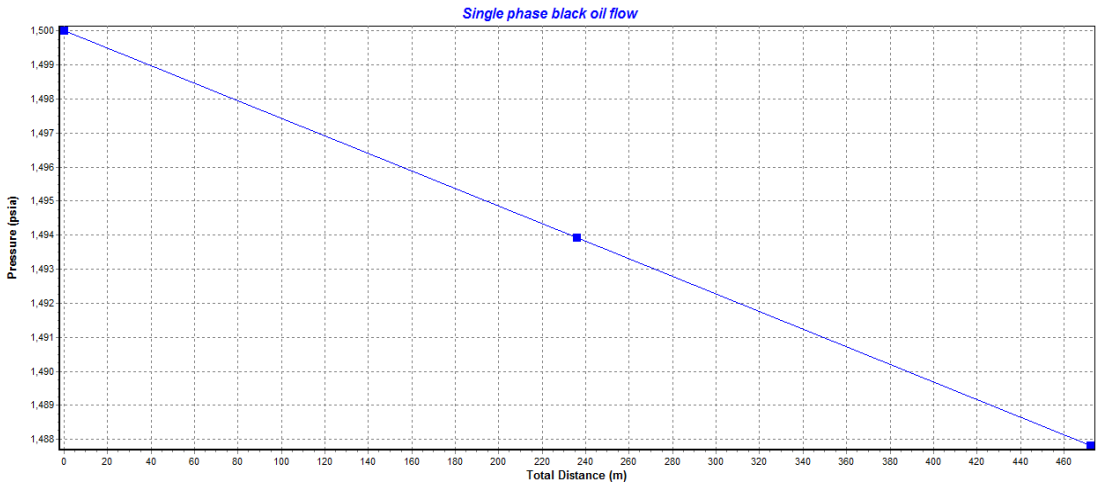


Figure 18 : Total pressure drop on Sahara pipeline case on single phase black oil

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Pressure Drop (psi) Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Densities (lb/ft3) Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_1														
1	0.0000	0.0000	1.699	88.30	1500.0	68.000	2.0634	0.0000	0.0000	24938.	0.00000	37.041	1.0e-6		LIQUID
2	774.28	22.966	1.699	88.30	1493.9	67.976	2.0637	5.9071	.18655	24942.	0.00000	37.036	1.0e-6	Huge	LIQUID
3	1548.6	45.932	1.699	88.30	1487.8	67.952	2.0639	5.9063	.18656	24945.	0.00000	37.031	1.0e-6	Huge	LIQUID

Figure 19: Pressure drop due to elevation effect on single phase black oil

Type of flow	Net Elevation (m)	Pressure at start (psi)	Pressure at end (psi)	Total pressure change (psi)	Total percentage change(%)	Pressure change due to elevation (psi)	Percentage change due to elevation (%)
Single phase black oil	14	1500	1487.8	12.2	0.813%	11.8	0.786%

Table 3: Percentage of pressure drop due to elevation effect on single phase black oil

Single phase gas on Sahara pipeline case

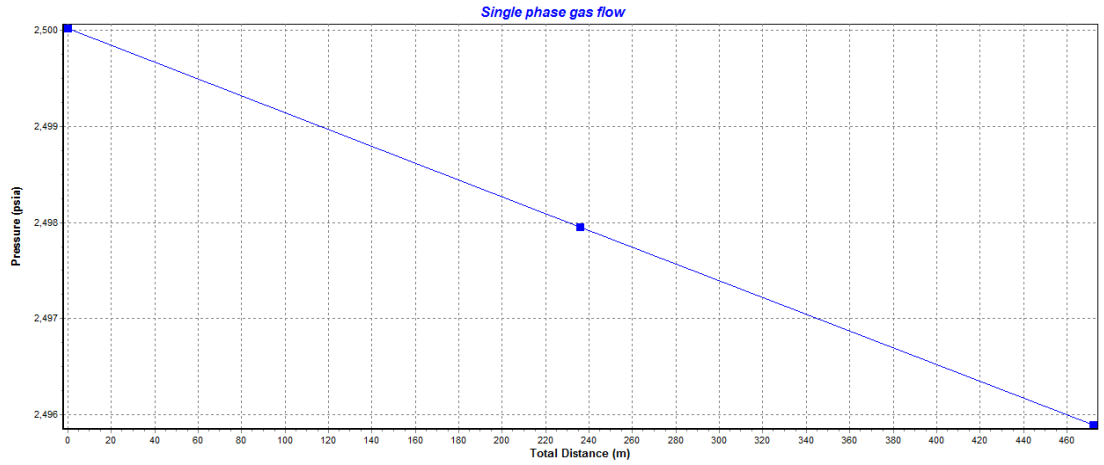


Figure 20: Total pressure drop on Sahara pipeline case on single phase gas

	Dist.	Elev.	Horiz. Angle	Vert. Devn.	Pres.	Temp.	Mean Vel.	Pressure Drop (psi)		Liquid Flow	Free Gas	Densities (lb/ft3)		Slug Number	Flow Pattern
	(feet)	(feet)	(deg)	(deg)	(psia)	(F)	(ft/s)	Elev.	Frictn.	(bbl/d)	(mmscfd)	Liquid	Gas	(PI-SS)	
FLOWLINE Flowline_1															
1	0.0000	0.0000	1.699	88.30	2500.0	68.000	2.9887	0.0000	0.0000	0.0000	26.0000	.00010	11.778		GAS
2	774.28	22.966	1.699	88.30	2497.9	67.903	2.9899	1.8780	.18389	0.0000	26.0000	.00010	11.773	Huge	GAS
3	1548.6	45.932	1.699	88.30	2495.9	67.807	2.9911	1.8772	.18396	0.0000	26.0000	.00010	11.768	Huge	GAS

Figure 21: Pressure drop due to elevation effect on single phase gas

Type of flow	Net Elevation (m)	Pressure at start (psi)	Pressure at end (psi)	Total pressure change (psi)	Total percentage change(%)	Pressure change due to elevation (psi)	Percentage change due to elevation (%)
Single phase gas	14	2500	2495.9	4.1	0.164%	3.74	0.149%

Table 4 : Percentage of pressure drop due to elevation effect on single phase gas

Multiphase flow on Sahara pipeline case

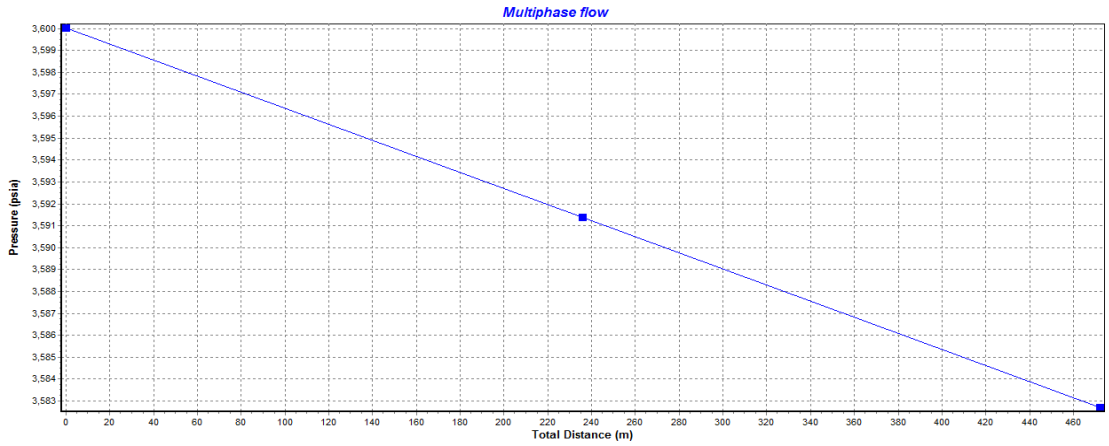


Figure 22: Total pressure drop on Sahara pipeline case on multiphase flow

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Pressure Drop (psi) Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Densities (lb/ft3) Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_2														
1	0.0000	0.0000	1.699	88.30	3600.0	68.000	.98282	0.0000	0.0000	10834.	2.00257	56.687	19.541		B/B TRANSITION
2	774.28	22.966	1.699	88.30	3591.3	67.984	.98295	8.4747	.18602	10831.	2.00827	56.696	19.524	13.05	B/B TRANSITION
3	1548.6	45.932	1.699	88.30	3582.7	67.969	.98308	8.4735	.18636	10829.	2.01398	56.704	19.506	6.52	B/B TRANSITION

Figure 23: Pressure drop due to elevation on multiphase

Type of flow	Net Elevation (m)	Pressure at start (psi)	Pressure at end (psi)	Total pressure change (psi)	Total percentage change(%)	Pressure change due to elevation (psi)	Percentage change due to elevation (%)
Single phase gas	14	3600	3582	18	0.5%	16.94	0.47%

Table 5: Percentage of pressure drop due to elevation effect on multiphase

4.5 DISCUSSION

Based on these results on elevation manipulation on Table 2, it was found that the effect of elevation on pressure drop is most significant in single phase black oil flow in pipeline since when the elevation is (+) 1300ft the percentage of pressure drop is 23.24%, on 0 ft of elevation the percentage of pressure drop is 0% and 20.09% of pressure increase occurred in (-) 1300ft of elevation. The second position is the multiphase flow where 13.32% pressure drop at (+) 1300ft of elevation and 11.12% increase at (-) 1300ft of elevation .The less significant is single gas flow where the pressure drop play minor effect where only 4.17% of pressure drop and 4.26% of pressure increase in (+)1300ft and (-)1300ft respectively. This is most due to the difference in density between single phase black oil, single phase gas and multiphase flow even the density in multiphase flow behave differently because the heavier the fluids the more pressure drop will be expected.

Hence, the statement in Donald F.B Jackson paper on "Filtering Elevation Profile Data to Improve Performance of Multiphase Pipeline Simulations" is proven where he state that "the effect of the elevation profile on pressure losses in a multiphase pipeline is much more significant", where he is comparing this effect to single gas flow. The result will be different if the water content in this multiphase flow is appear because in all cases the author use the 0% of watercut and Gas Oil Ratio (GOR) was 565scf/stb.

This result can be confirmed by the use of real case in pipeline based on oil and gas pipeline in Sahara. The author used a small segment of pipeline in Sahara and found that percentage change of pressure drop due to elevation is the highest where it was 0.786% at single phase black oil follow by 0.47% at multiphase flow and 0.149% at single phase gas by modeling this pipeline into PIPESIM™.

The rule of thumb for particular pressure rise resulting from resistance to flow can involve increasing the drive energy on the compressor by 1% of the connected power for each 2 psi of differential. For discussion purposes, considering the multiphase flow pipeline at +1300 feet of elevation, the inlet pressure is at 3600 psi and resulting in 13.32% of pressure drop which is 3055 psi at outlet. Using techno-economics details for the compressor:

Power consumption without pressure drop: 57.8 kW
Rule of thumb: 1% increasing power for 2 psi of differential
Power consumption with pressure drop: 157.505 kW
Actual energy losses due to overcome pressure drop: 99.705 kW
Operating hours: 16 h/day
Electricity cost: RM25.30 kWh
Value of losses: RM404.80/day
Value of losses per year (300days working days): RM121, 440

This value only considering the pressure drop of multiphase flow ONLY at elevation effect without considering pressure drop at the friction effect, it suppose to be more value of losses if considering friction losses and elevation losses.

CHAPTER 5:

CONCLUSION

In conclusion, the percentage of relevancy to the objectives is high. The pressure drop in multiphase flow is significant in this study compare to the gas but it was below if comparing to single phase black oil, but the existence of single black oil is rarely to be discusses in oil and gas industry. The different number in values of pressure drops is most to the difference in density among these fluids. This study can be use to oil and gas industry particularly in pipeline transportation technically on the capability of the compressor and pump in transporting the oil and gas as presented in techno-economics term. There are also several ways to improve this research for example by using the real data on multiphase composition and evaluate why the multiphase flow play a role in pressure drop compare to the single phase gas. The study in multiphase flow is must in this case since at the present time, many industrial processes rely on multi-phase phenomena for the transport of energy and mass or for material processing since the multiphase flow is a common parameter in oil and gas industry from the reservoir to the facilities. The term slug, liquid hold up and the effect of undulation also can be factors that affect the pressure drop due to elevation. The technology for multi-phase flow is in a very different stage of development. The rise and fall in elevations between the origin A and the terminus B have to be accounted for separately and summed up**.** Although multi-phase flow occurs in many industrial processes, methods of transporting multi-phase fluids through pipelines and wells have advanced rapidly in recent decades. Multi-phase petroleum wells have existed for a long time, and multi-phase flow plays an important role in the process industry, the nuclear industry, and many others. In spite of that, calculation methods have traditionally been relatively inaccurate and unreliable, at times balancing somewhere between art and science.

REFERENCES

1. E.Shashi Menon " Gas Pipeline Hydraulics" Taylor & Francis Group.2005

2. Thomas O. Miesner, William L. Leffler "Oil & Gas Pipelines: In Nontechnical Language" PennWell.2006.

3. Mohan Kelkar. "Natural Gas Production Engineering".PennWell.2008.

4. H. Dale Beggs. "Production Optimization Using Nodal Analysis". OGCI and Petroskills Publications.2003.

5. Donald F.B Jackson. "Filtering Profile Data to Improve Performance of Multiphase Pipeline Simulations".SPE.2008.

6. Schlumberger Information Solutions.2007.PIPESIM Fundamentals : Training and Exercise Guide Version 2006.1

7. Evangelos Michalopoulos .Sandy Babka.2000."Evaluation of Pipeline Design Factors". The Hartford Steam Boiler Inspection and Insurance Company Hartford.

8. J Rajnauth. K Ayeni .et al 2008. "Gas Transportation: Present and Future". Texas A&M University.

9. "Distribution Piping: Understanding Pressure Drop" Compressed Air Challenge. Office of Industrial Technologies.

10. Kirby S. Chapman.et al 2005. "Final Technical Report: Virtual Pipeline System Testbed to Optimize the U.S. Natural GasTransmission Pipeline System"

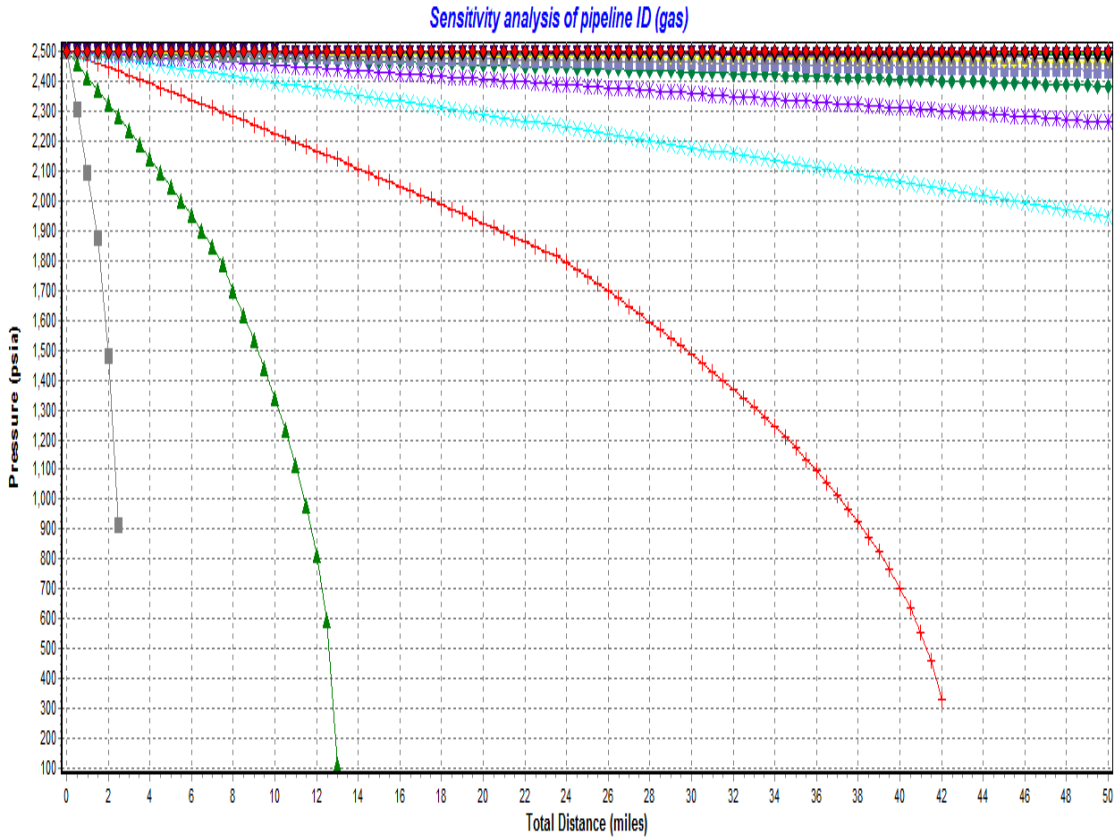
11. E.Shashi Menon " Liquid Pipeline Hydraulics" Taylor & Francis Group.2004

12. Citing websites. "Pipeline Design Factor" http://www.canqualpro.ca/

13. Petroleum Engineering handbook for the practicing engineer, volume 1 , Mohammed A. Mian.1992

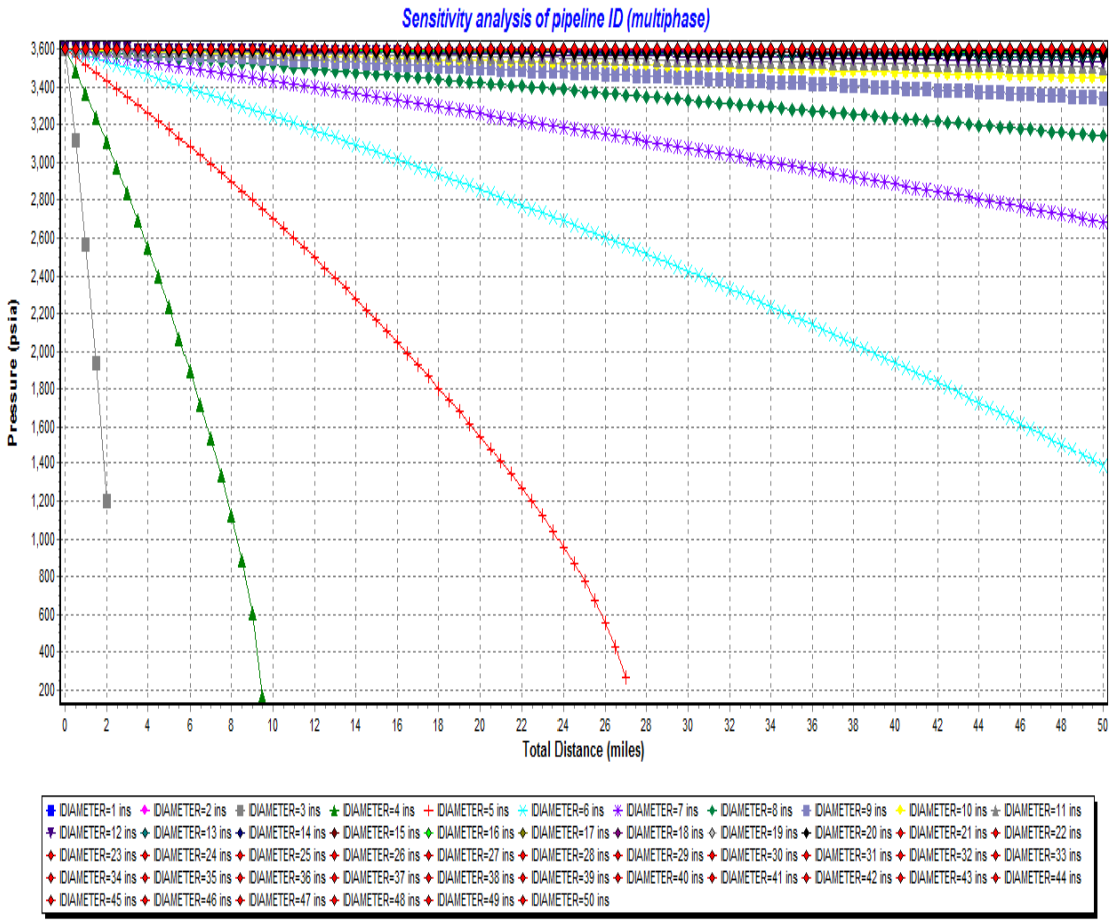
APPENDIX

Sensitivity analysis for pipeline ID (single phase gas)



Total Distance (miles)	**Pressure (psia)**	**Total Distance (miles)**	**Pressure (psia)**	**Total Distance (miles)**	**Pressure (psia)**
IDIAMETER= 9 ins	IDIAMETER= 9 ins	IDIAMETER= 9 ins	IDIAMETER= 9 ins	IDIAMETER= 9 ins	IDIAMETER= 9 ins
0	2500.016	16.5	2479.285	33.5	2457.795
0	2500.016	17	2478.645	34	2457.165
0.5	2499.386	17.5	2478.015	34.5	2456.525
1	2498.766	18	2477.385	35	2455.895
1.5	2498.136	18.5	2476.755	35.5	2455.265
2	2497.506	19	2476.125	36	2454.625
2.5	2496.886	19.5	2475.495	36.5	2453.995
3	2496.256	20	2474.865	37	2453.355
3.5	2495.626	20.5	2474.235	37.5	2452.725
4	2494.996	21	2473.605	38	2452.085
4.5	2494.376	21.5	2472.975	38.5	2451.455
5	2493.746	22	2472.345	39	2450.815
5.5	2493.116	22.5	2471.715	39.5	2450.185
6	2492.486	23	2471.075	40	2449.545
6.5	2491.866	23.5	2470.445	40.5	2448.915
7	2491.236	24	2469.815	41	2448.275
7.5	2490.606	24.5	2469.185	41.5	2447.645
8	2489.976	25	2468.555	42	2447.005
8.5	2489.346	25.5	2467.925	42.5	2446.375
9	2488.716	26	2467.285	43	2445.735
9.5	2488.096	26.5	2466.655	43.5	2445.105
10	2487.466	27	2466.025	44	2444.465
10.5	2486.836	27.5	2465.395	44.5	2443.825
11	2486.206	28	2464.765	45	2443.195
11.5	2485.576	28.5	2464.125	45.5	2442.555
12	2484.945	29	2463.495	46	2441.915
12.5	2484.315	29.5	2462.865	46.5	2441.285
13	2483.685	30	2462.225	47	2440.645
13.5	2483.055	30.5	2461.595	47.5	2440.015
14	2482.425	31	2460.965	48	2439.375
14.5	2481.795	31.5	2460.325	48.5	2438.735
15	2481.175	32	2459.695	49	2438.095
15.5	2480.545	32.5	2459.065	49.5	2437.465
16	2479.915	33	2458.425	50	2436.825

Sensitivity analysis for pipeline ID (multiphase)



Total Distance (miles)	**Pressure (psia)**	**Total Distance (miles)**	**Pressure (psia)**	**Total Distance (miles)**	**Pressure (psia)**
IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins	IDIAMETER= 12 ins
0	3600.022	16.5	3578.652	33.5	3556.532
0	3600.022	17	3578.002	34	3555.882
0.5	3599.372	17.5	3577.352	34.5	3555.232
1	3598.732	18	3576.712	35	3554.582
1.5	3598.082	18.5	3576.062	35.5	3553.922
2	3597.442	19	3575.412	36	3553.272
2.5	3596.792	19.5	3574.762	36.5	3552.622
3	3596.142	20	3574.112	37	3551.972
3.5	3595.502	20.5	3573.462	37.5	3551.312
4	3594.852	21	3572.812	38	3550.662
4.5	3594.202	21.5	3572.162	38.5	3550.012
5	3593.562	22	3571.512	39	3549.352
5.5	3592.912	22.5	3570.862	39.5	3548.702
6	3592.262	23	3570.212	40	3548.052
6.5	3591.612	23.5	3569.562	40.5	3547.392
7	3590.972	24	3568.912	41	3546.742
7.5	3590.322	24.5	3568.262	41.5	3546.092
8	3589.672	25	3567.612	42	3545.432
8.5	3589.032	25.5	3566.962	42.5	3544.782
9	3588.382	26	3566.312	43	3544.132
9.5	3587.732	26.5	3565.652	43.5	3543.472
10	3587.082	27	3565.002	44	3542.822
10.5	3586.432	27.5	3564.352	44.5	3542.162
11	3585.792	28	3563.702	45	3541.512
11.5	3585.142	28.5	3563.052	45.5	3540.862
12	3584.492	29	3562.402	46	3540.202
12.5	3583.842	29.5	3561.752	46.5	3539.552
13	3583.192	30	3561.102	47	3538.892
13.5	3582.552	30.5	3560.442	47.5	3538.242
14	3581.902	31	3559.792	48	3537.582
14.5	3581.252	31.5	3559.142	48.5	3536.932
15	3580.602	32	3558.492	49	3536.272
15.5	3579.952	32.5	3557.842	49.5	3535.622
16	3579.302	33	3557.192	50	3534.962

Single phase black oil, equalizing pressure drop due to friction

	Dist.	Elev.	Horiz. Angle	Vert. Devn.	Pres.	Temp.	Mean Vel.	Pressure Drop (psi)		Liquid Flow	Free Gas	Densities (lb/ft3)		Slug Number	Flow Pattern
	(feet)	(feet)	(deg)	(deg)	(psia)	(F)	(ft/s)	Elev.	Frictn.	(bbl/d)	(mmscfd)	Liquid	Gas	(PI-SS)	
FLOWLINE Flowline_1															
1	0.0000	0.0000	0.000	90.00	1500.0	68.000	2.0634	0.0000	0.0000	24938.	0.00000	37.041	1.0e-6		LIQUID
2	2640.0	0.0000	0.000	90.00	1499.4	68.003	2.0634	0.0000	.63575	24939.	0.00000	37.041	1.0e-6	Huge	LIQUID
3	5280.0	0.0000	0.000	90.00	1498.7	68.006	2.0635	0.0000	.63576	24939.	0.00000	37.040	1.0e-6	Huge	LIQUID
4	7920.0	0.0000	0.000	90.00	1498.1	68.009	2.0635	0.0000	.63577	24940.	0.00000	37.039	1.0e-6	Huge	LIQUID
5	10560.	0.0000	0.000	90.00	1497.5	68.011	2.0635	0.0000	.63577	24940.	0.00000	37.038	1.0e-6	Huge	LIQUID
6	13200.	0.0000	0.000	90.00	1496.8	68.014	2.0636	0.0000	.63578	24941.	0.00000	37.038	1.0e-6	Huge	LIQUID
7	15840.	0.0000	0.000	90.00	1496.2	68.017	2.0636	0.0000	.63579	24941.	0.00000	37.037	1.0e-6	Huge	LIQUID
8	18480.	0.0000	0.000	90.00	1495.5	68.020	2.0637	0.0000	.63579	24942.	0.00000	37.036	1.0e-6	Huge	LIQUID
9	21120.	0.0000	0.000	90.00	1494.9	68.023	2.0637	0.0000	.63580	24942.	0.00000	37.036	1.0e-6	Huge	LIQUID
10	23760.	0.0000	0.000	90.00	1494.3	68.026	2.0637	0.0000	.63581	24943.	0.00000	37.035	1.0e-6	Huge	LIQUID
11	26400.	0.0000	0.000	90.00	1493.6	68.029	2.0638	0.0000	.63582	24943.	0.00000	37.034	1.0e-6	Huge	LIQUID
12	29040.	0.0000	0.000	90.00	1493.0	68.031	2.0638	0.0000	.63582	24943.	0.00000	37.033	1.0e-6	Huge	LIQUID
13	31680.	0.0000	0.000	90.00	1492.4	68.034	2.0639	0.0000	.63583	24944.	0.00000	37.033	1.0e-6	Huge	LIQUID
14	34320.	0.0000	0.000	90.00	1491.7	68.037	2.0639	0.0000	.63584	24944.	0.00000	37.032	1.0e-6	Huge	LIQUID
15	36960.	0.0000	0.000	90.00	1491.1	68.040	2.0639	0.0000	.63584	24945.	0.00000	37.031	1.0e-6	Huge	LIQUID
16	39600.	0.0000	0.000	90.00	1490.5	68.043	2.0640	0.0000	.63585	24945.	0.00000	37.030	1.0e-6	Huge	LIQUID
17	42240.	0.0000	0.000	90.00	1489.8	68.046	2.0640	0.0000	.63586	24946.	0.00000	37.030	1.0e-6	Huge	LIQUID
18	44880.	0.0000	0.000	90.00	1489.2	68.049	2.0641	0.0000	.63586	24946.	0.00000	37.029	1.0e-6	Huge	LIQUID
19	47520.	0.0000	0.000	90.00	1488.6	68.051	2.0641	0.0000	.63587	24947.	0.00000	37.028	1.0e-6	Huge	LIQUID
20	50160.	0.0000	0.000	90.00	1487.9	68.054	2.0641	0.0000	.63588	24947.	0.00000	37.028	1.0e-6	Huge	LIQUID
21	52800.	0.0000	0.000	90.00	1487.3	68.057	2.0642	0.0000	.63588	24948.	0.00000	37.027	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
31	79200.	0.0000	0.000	90.00	1480.9	68.086	2.0646	0.0000	.63595	24953.	0.00000	37.020	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
41	105600	0.0000	0.000	90.00	1474.6	68.114	2.0650	0.0000	.63602	24958.	0.00000	37.012	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
51	132000	0.0000	0.000	90.00	1468.2	68.143	2.0654	0.0000	.63609	24963.	0.00000	37.005	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
61	158400	0.0000	0.000	90.00	1461.8	68.171	2.0658	0.0000	.63616	24967.	0.00000	36.998	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
71	184800	0.0000	0.000	90.00	1455.5	68.200	2.0662	0.0000	.63622	24972.	0.00000	36.990	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
81	211200	0.0000	0.000	90.00	1449.1	68.228	2.0666	0.0000	.63629	24977.	0.00000	36.983	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
91	237600	0.0000	0.000	90.00	1442.8	68.257	2.0670	0.0000	.63636	24982.	0.00000	36.976	1.0e-6	Huge	LIQUID
xxxxxxxxxx															
101	264000	0.0000	0.000	90.00	1436.4	68.285	2.0674	0.0000	.63643	24987.	0.00000	36.969	1.0e-6	Huge	LIQUID

Single phase gas, equalizing pressure drop due to friction

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE Flowline_1															
1	0.0000	0.0000	0.000	90.00	2500.0	68.000	2.9887	0.0000	0.0000	0.0000	26.0000	.00010	11.778		GAS
2	2640.0	0.0000	0.000	90.00	2499.4	67.983	2.9892	0.0000	.62665	0.0000	26.0000	.00010	11.776	Huge	GAS
3	5280.0	0.0000	0.000	90.00	2498.7	67.965	2.9897	0.0000	.62676	0.0000	26.0000	.00010	11.774	Huge	GAS
4	7920.0	0.0000	0.000	90.00	2498.1	67.948	2.9902	0.0000	.62686	0.0000	26.0000	.00010	11.772	Huge	GAS
5	10560.	0.0000	0.000	90.00	2497.5	67.930	2.9907	0.0000	.62696	0.0000	26.0000	.00010	11.770	Huge	GAS
6	13200.	0.0000	0.000	90.00	2496.9	67.913	2.9912	0.0000	.62707	0.0000	26.0000	.00010	11.768	Huge	GAS
7	15840.	0.0000	0.000	90.00	2496.2	67.895	2.9917	0.0000	.62717	0.0000	26.0000	.00010	11.766	Huge	GAS
8	18480.	0.0000	0.000	90.00	2495.6	67.878	2.9922	0.0000	.62728	0.0000	26.0000	.00010	11.764	Huge	GAS
9	21120.	0.0000	0.000	90.00	2495.0	67.860	2.9927	0.0000	.62738	0.0000	26.0000	.00010	11.762	Huge	GAS
10	23760.	0.0000	0.000	90.00	2494.4	67.843	2.9932	0.0000	.62748	0.0000	26.0000	.00010	11.760	Huge	GAS
11	26400.	0.0000	0.000	90.00	2493.7	67.825	2.9937	0.0000	.62759	0.0000	26.0000	.00010	11.758	Huge	GAS
12	29040.	0.0000	0.000	90.00	2493.1	67.808	2.9943	0.0000	.62769	0.0000	26.0000	.00010	11.756	Huge	GAS
13	31680.	0.0000	0.000	90.00	2492.5	67.790	2.9948	0.0000	.62780	0.0000	26.0000	.00010	11.754	Huge	GAS
14	34320.	0.0000	0.000	90.00	2491.8	67.773	2.9953	0.0000	.62790	0.0000	26.0000	.00010	11.752	Huge	GAS
15	36960.	0.0000	0.000	90.00	2491.2	67.755	2.9958	0.0000	.62801	0.0000	26.0000	.00010	11.750	Huge	GAS
16	39600.	0.0000	0.000	90.00	2490.6	67.738	2.9963	0.0000	.62811	0.0000	26.0000	.00010	11.748	Huge	GAS
17	42240.	0.0000	0.000	90.00	2490.0	67.720	2.9968	0.0000	.62822	0.0000	26.0000	.00010	11.746	Huge	GAS
18	44880.	0.0000	0.000	90.00	2489.3	67.702	2.9973	0.0000	.62832	0.0000	26.0000	.00010	11.744	Huge	GAS
19	47520.	0.0000	0.000	90.00	2488.7	67.685	2.9978	0.0000	.62843	0.0000	26.0000	.00010	11.742	Huge	GAS
20	50160.	0.0000	0.000	90.00	2488.1	67.667	2.9983	0.0000	.62853	0.0000	26.0000	.00010	11.740	Huge	GAS
21	52800.	0.0000	0.000	90.00	2487.4	67.650	2.9989	0.0000	.62864	0.0000	26.0000	.00010	11.738	Huge	GAS
xxxxxxxxxxxxxxxx															
31	79200.	0.0000	0.000	90.00	2481.2	67.474	3.0040	0.0000	.62969	0.0000	26.0000	.00010	11.718	Huge	GAS
xxxxxxxxxxxxxxxx															
41	105600	0.0000	0.000	90.00	2474.9	67.298	3.0092	0.0000	.63075	0.0000	26.0000	.00010	11.697	Huge	GAS
xxxxxxxxxxxxxxxx															
51	132000	0.0000	0.000	90.00	2468.5	67.122	3.0144	0.0000	.63181	0.0000	26.0000	.00010	11.677	Huge	GAS
xxxxxxxxxxxxxxxx															
61	158400	0.0000	0.000	90.00	2462.2	66.945	3.0196	0.0000	.63289	0.0000	26.0000	.00010	11.657	Huge	GAS
xxxxxxxxxxxxxxxx															
71	184800	0.0000	0.000	90.00	2455.9	66.768	3.0249	0.0000	.63397	0.0000	26.0000	.00010	11.637	Huge	GAS
xxxxxxxxxxxxxxxx															
81	211200	0.0000	0.000	90.00	2449.5	66.591	3.0302	0.0000	.63505	0.0000	26.0000	.00010	11.616	Huge	GAS
xxxxxxxxxxxxxxxx															
91	237600	0.0000	0.000	90.00	2443.2	66.413	3.0355	0.0000	.63614	0.0000	26.0000	.00010	11.596	Huge	GAS
xxxxxxxxxxxxxxxx															
101	264000	0.0000	0.000	90.00	2436.8	66.235	3.0408	0.0000	.63724	0.0000	26.0000	.00010	11.576	Huge	GAS

Multiphase flow, equalizing pressure drop due to friction

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE Flowline_2															
1	0.0000	0.0000	0.000	90.00	3600.0	68.000	1.0440	0.0000	0.0000	11778.	1.65514	50.225	19.541		B/B TRANSITION
2	2640.0	0.0000	0.000	90.00	3599.4	68.002	1.0440	0.0000	.62725	11778.	1.65600	50.226	19.540	4.22	B/B TRANSITION
3	5280.0	0.0000	0.000	90.00	3598.7	68.005	1.0440	0.0000	.62736	11777.	1.65686	50.227	19.538	2.11	B/B TRANSITION
4	7920.0	0.0000	0.000	90.00	3598.1	68.007	1.0440	0.0000	.62746	11777.	1.65772	50.228	19.537	1.41	B/B TRANSITION
5	10560.	0.0000	0.000	90.00	3597.5	68.010	1.0440	0.0000	.62757	11776.	1.65859	50.229	19.535	1.06	B/B TRANSITION
6	13200.	0.0000	0.000	90.00	3596.9	68.012	1.0440	0.0000	.62768	11776.	1.65946	50.230	19.534	0.85	B/B TRANSITION
7	15840.	0.0000	0.000	90.00	3596.2	68.014	1.0441	0.0000	.62779	11776.	1.66031	50.231	19.532	0.70	B/B TRANSITION
8	18480.	0.0000	0.000	90.00	3595.6	68.016	1.0441	0.0000	.62790	11775.	1.66118	50.231	19.531	0.60	B/B TRANSITION
9	21120.	0.0000	0.000	90.00	3595.0	68.019	1.0441	0.0000	.62801	11775.	1.66203	50.232	19.530	0.53	B/B TRANSITION
10	23760.	0.0000	0.000	90.00	3594.4	68.021	1.0441	0.0000	.62811	11774.	1.66290	50.233	19.528	0.47	B/B TRANSITION
11	26400.	0.0000	0.000	90.00	3593.7	68.023	1.0441	0.0000	.62822	11774.	1.66375	50.234	19.527	0.42	B/B TRANSITION
12	29040.	0.0000	0.000	90.00	3593.1	68.024	1.0441	0.0000	.62833	11774.	1.66462	50.235	19.525	0.38	B/B TRANSITION
13	31680.	0.0000	0.000	90.00	3592.5	68.026	1.0441	0.0000	.62844	11773.	1.66547	50.236	19.524	0.35	B/B TRANSITION
14	34320.	0.0000	0.000	90.00	3591.8	68.028	1.0442	0.0000	.62855	11773.	1.66633	50.237	19.523	0.33	B/B TRANSITION
15	36960.	0.0000	0.000	90.00	3591.2	68.030	1.0442	0.0000	.62865	11772.	1.66719	50.238	19.521	0.30	B/B TRANSITION
16	39600.	0.0000	0.000	90.00	3590.6	68.032	1.0442	0.0000	.62876	11772.	1.66805	50.239	19.520	0.28	B/B TRANSITION
17	42240.	0.0000	0.000	90.00	3590.0	68.033	1.0442	0.0000	.62887	11772.	1.66890	50.240	19.518	0.26	B/B TRANSITION
18	44880.	0.0000	0.000	90.00	3589.3	68.035	1.0442	0.0000	.62898	11771.	1.66976	50.241	19.517	0.25	B/B TRANSITION
19	47520.	0.0000	0.000	90.00	3588.7	68.037	1.0442	0.0000	.62909	11771.	1.67062	50.241	19.516	0.24	B/B TRANSITION
20	50160.	0.0000	0.000	90.00	3588.1	68.038	1.0442	0.0000	.62919	11770.	1.67147	50.242	19.514	0.22	B/B TRANSITION
21	52800.	0.0000	0.000	90.00	3587.4	68.040	1.0442	0.0000	.62930	11770.	1.67233	50.243	19.513	0.21	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
31	79200.	0.0000	0.000	90.00	3581.1	68.052	1.0444	0.0000	.63038	11766.	1.68087	50.253	19.499	0.14	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
41	105600	0.0000	0.000	90.00	3574.8	68.062	1.0445	0.0000	.63146	11762.	1.68938	50.262	19.485	0.11	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
51	132000	0.0000	0.000	90.00	3568.5	68.069	1.0446	0.0000	.63253	11758.	1.69789	50.271	19.472	0.09	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
61	158400	0.0000	0.000	90.00	3562.2	68.074	1.0447	0.0000	.63361	11754.	1.70639	50.281	19.458	0.07	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
71	184800	0.0000	0.000	90.00	3555.8	68.078	1.0448	0.0000	.63469	11750.	1.71488	50.290	19.445	0.06	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
81	211200	0.0000	0.000	90.00	3549.5	68.081	1.0450	0.0000	.63578	11745.	1.72338	50.299	19.431	0.05	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
91	237600	0.0000	0.000	90.00	3543.1	68.083	1.0451	0.0000	.63687	11741.	1.73188	50.309	19.417	0.05	B/B TRANSITION
xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx															
101	264000	0.0000	0.000	90.00	3536.7	68.085	1.0452	0.0000	.63796	11737.	1.74040	50.318	19.404	0.04	B/B TRANSITION

Single phase black oil at 0 feet elevation

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Pressure Drop (psi) Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Densities (lb/ft3) Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_1														
1	0.0000	0.0000	0.000	90.00	1500.0	68.000	2.0634	0.0000	0.0000	24938.	0.00000	37.041	1.0e-6		LIQUID
2	2640.0	0.0000	0.000	90.00	1499.4	68.003	2.0634	0.0000	.63575	24939.	0.00000	37.041	1.0e-6	Huge	LIQUID
3	5280.0	0.0000	0.000	90.00	1498.7	68.006	2.0635	0.0000	.63576	24939.	0.00000	37.040	1.0e-6	Huge	LIQUID
4	7920.0	0.0000	0.000	90.00	1498.1	68.009	2.0635	0.0000	.63577	24940.	0.00000	37.039	1.0e-6	Huge	LIQUID
5	10560.	0.0000	0.000	90.00	1497.5	68.011	2.0635	0.0000	.63577	24940.	0.00000	37.038	1.0e-6	Huge	LIQUID
6	13200.	0.0000	0.000	90.00	1496.8	68.014	2.0636	0.0000	.63578	24941.	0.00000	37.038	1.0e-6	Huge	LIQUID
7	15840.	0.0000	0.000	90.00	1496.2	68.017	2.0636	0.0000	.63579	24941.	0.00000	37.037	1.0e-6	Huge	LIQUID
8	18480.	0.0000	0.000	90.00	1495.5	68.020	2.0637	0.0000	.63579	24942.	0.00000	37.036	1.0e-6	Huge	LIQUID
9	21120.	0.0000	0.000	90.00	1494.9	68.023	2.0637	0.0000	.63580	24942.	0.00000	37.036	1.0e-6	Huge	LIQUID
10	23760.	0.0000	0.000	90.00	1494.3	68.026	2.0637	0.0000	.63581	24943.	0.00000	37.035	1.0e-6	Huge	LIQUID
11	26400.	0.0000	0.000	90.00	1493.6	68.029	2.0638	0.0000	.63582	24943.	0.00000	37.034	1.0e-6	Huge	LIQUID
12	29040.	0.0000	0.000	90.00	1493.0	68.031	2.0638	0.0000	.63582	24943.	0.00000	37.033	1.0e-6	Huge	LIQUID
13	31680.	0.0000	0.000	90.00	1492.4	68.034	2.0639	0.0000	.63583	24944.	0.00000	37.033	1.0e-6	Huge	LIQUID
14	34320.	0.0000	0.000	90.00	1491.7	68.037	2.0639	0.0000	.63584	24944.	0.00000	37.032	1.0e-6	Huge	LIQUID
15	36960.	0.0000	0.000	90.00	1491.1	68.040	2.0639	0.0000	.63584	24945.	0.00000	37.031	1.0e-6	Huge	LIQUID
16	39600.	0.0000	0.000	90.00	1490.5	68.043	2.0640	0.0000	.63585	24945.	0.00000	37.030	1.0e-6	Huge	LIQUID
17	42240.	0.0000	0.000	90.00	1489.8	68.046	2.0640	0.0000	.63586	24946.	0.00000	37.030	1.0e-6	Huge	LIQUID
18	44880.	0.0000	0.000	90.00	1489.2	68.049	2.0641	0.0000	.63586	24946.	0.00000	37.029	1.0e-6	Huge	LIQUID
19	47520.	0.0000	0.000	90.00	1488.6	68.051	2.0641	0.0000	.63587	24947.	0.00000	37.028	1.0e-6	Huge	LIQUID
20	50160.	0.0000	0.000	90.00	1487.9	68.054	2.0641	0.0000	.63588	24947.	0.00000	37.028	1.0e-6	Huge	LIQUID
21	52800.	0.0000	0.000	90.00	1487.3	68.057	2.0642	0.0000	.63588	24948.	0.00000	37.027	1.0e-6	Huge	LIQUID
22	55440.	0.0000	0.000	90.00	1486.6	68.060	2.0642	0.0000	.63589	24948.	0.00000	37.026	1.0e-6	Huge	LIQUID
23	58080.	0.0000	0.000	90.00	1486.0	68.063	2.0643	0.0000	.63590	24949.	0.00000	37.025	1.0e-6	Huge	LIQUID
24	60720.	0.0000	0.000	90.00	1485.4	68.066	2.0643	0.0000	.63590	24949.	0.00000	37.025	1.0e-6	Huge	LIQUID
25	63360.	0.0000	0.000	90.00	1484.7	68.069	2.0643	0.0000	.63591	24950.	0.00000	37.024	1.0e-6	Huge	LIQUID
26	66000.	0.0000	0.000	90.00	1484.1	68.071	2.0644	0.0000	.63592	24950.	0.00000	37.023	1.0e-6	Huge	LIQUID
27	68640.	0.0000	0.000	90.00	1483.5	68.074	2.0644	0.0000	.63592	24951.	0.00000	37.022	1.0e-6	Huge	LIQUID
28	71280.	0.0000	0.000	90.00	1482.8	68.077	2.0645	0.0000	.63593	24951.	0.00000	37.022	1.0e-6	Huge	LIQUID
29	73920.	0.0000	0.000	90.00	1482.2	68.080	2.0645	0.0000	.63594	24952.	0.00000	37.021	1.0e-6	Huge	LIQUID
30	76560.	0.0000	0.000	90.00	1481.6	68.083	2.0645	0.0000	.63594	24952.	0.00000	37.020	1.0e-6	Huge	LIQUID
31	79200.	0.0000	0.000	90.00	1480.9	68.086	2.0646	0.0000	.63595	24953.	0.00000	37.020	1.0e-6	Huge	LIQUID
32	81840.	0.0000	0.000	90.00	1480.3	68.088	2.0646	0.0000	.63596	24953.	0.00000	37.019	1.0e-6	Huge	LIQUID
33	84480.	0.0000	0.000	90.00	1479.7	68.091	2.0647	0.0000	.63596	24954.	0.00000	37.018	1.0e-6	Huge	LIQUID
34	87120.	0.0000	0.000	90.00	1479.0	68.094	2.0647	0.0000	.63597	24954.	0.00000	37.017	1.0e-6	Huge	LIQUID
35	89760.	0.0000	0.000	90.00	1478.4	68.097	2.0647	0.0000	.63598	24955.	0.00000	37.017	1.0e-6	Huge	LIQUID
36	92400.	0.0000	0.000	90.00	1477.7	68.100	2.0648	0.0000	.63599	24955.	0.00000	37.016	1.0e-6	Huge	LIQUID
37	95040.	0.0000	0.000	90.00	1477.1	68.103	2.0648	0.0000	.63599	24956.	0.00000	37.015	1.0e-6	Huge	LIQUID
38	97680.	0.0000	0.000	90.00	1476.5	68.106	2.0649	0.0000	.63600	24956.	0.00000	37.014	1.0e-6	Huge	LIQUID
39	100320	0.0000	0.000	90.00	1475.8	68.108	2.0649	0.0000	.63601	24957.	0.00000	37.014	1.0e-6	Huge	LIQUID
40	102960	0.0000	0.000	90.00	1475.2	68.111	2.0649	0.0000	.63601	24957.	0.00000	37.013	1.0e-6	Huge	LIQUID
41	105600	0.0000	0.000	90.00	1474.6	68.114	2.0650	0.0000	.63602	24958.	0.00000	37.012	1.0e-6	Huge	LIQUID
42	108240	0.0000	0.000	90.00	1473.9	68.117	2.0650	0.0000	.63603	24958.	0.00000	37.012	1.0e-6	Huge	LIQUID
43	110880	0.0000	0.000	90.00	1473.3	68.120	2.0651	0.0000	.63603	24959.	0.00000	37.011	1.0e-6	Huge	LIQUID
44	113520	0.0000	0.000	90.00	1472.7	68.123	2.0651	0.0000	.63604	24959.	0.00000	37.010	1.0e-6	Huge	LIQUID
45	116160	0.0000	0.000	90.00	1472.0	68.126	2.0652	0.0000	.63605	24960.	0.00000	37.009	1.0e-6	Huge	LIQUID
46	118800	0.0000	0.000	90.00	1471.4	68.128	2.0652	0.0000	.63605	24960.	0.00000	37.009	1.0e-6	Huge	LIQUID
47	121440	0.0000	0.000	90.00	1470.7	68.131	2.0652	0.0000	.63606	24961.	0.00000	37.008	1.0e-6	Huge	LIQUID
48	124080	0.0000	0.000	90.00	1470.1	68.134	2.0653	0.0000	.63607	24961.	0.00000	37.007	1.0e-6	Huge	LIQUID
49	126720	0.0000	0.000	90.00	1469.5	68.137	2.0653	0.0000	.63607	24962.	0.00000	37.006	1.0e-6	Huge	LIQUID
50	129360	0.0000	0.000	90.00	1468.8	68.140	2.0654	0.0000	.63608	24962.	0.00000	37.006	1.0e-6	Huge	LIQUID
51	132000	0.0000	0.000	90.00	1468.2	68.143	2.0654	0.0000	.63609	24963.	0.00000	37.005	1.0e-6	Huge	LIQUID
52	134640	0.0000	0.000	90.00	1467.6	68.146	2.0654	0.0000	.63609	24963.	0.00000	37.004	1.0e-6	Huge	LIQUID
53	137280	0.0000	0.000	90.00	1466.9	68.148	2.0655	0.0000	.63610	24964.	0.00000	37.004	1.0e-6	Huge	LIQUID
54	139920	0.0000	0.000	90.00	1466.3	68.151	2.0655	0.0000	.63611	24964.	0.00000	37.003	1.0e-6	Huge	LIQUID
55	142560	0.0000	0.000	90.00	1465.7	68.154	2.0656	0.0000	.63611	24965.	0.00000	37.002	1.0e-6	Huge	LIQUID
56	145200	0.0000	0.000	90.00	1465.0	68.157	2.0656	0.0000	.63612	24965.	0.00000	37.001	1.0e-6	Huge	LIQUID
57	147840	0.0000	0.000	90.00	1464.4	68.160	2.0656	0.0000	.63613	24966.	0.00000	37.001	1.0e-6	Huge	LIQUID
58	150480	0.0000	0.000	90.00	1463.8	68.163	2.0657	0.0000	.63614	24966.	0.00000	37.000	1.0e-6	Huge	LIQUID
59	153120	0.0000	0.000	90.00	1463.1	68.166	2.0657	0.0000	.63614	24966.	0.00000	36.999	1.0e-6	Huge	LIQUID
60	155760	0.0000	0.000	90.00	1462.5	68.168	2.0658	0.0000	.63615	24967.	0.00000	36.998	1.0e-6	Huge	LIQUID
61	158400	0.0000	0.000	90.00	1461.8	68.171	2.0658	0.0000	.63616	24967.	0.00000	36.998	1.0e-6	Huge	LIQUID
62	161040	0.0000	0.000	90.00	1461.2	68.174	2.0658	0.0000	.63616	24968.	0.00000	36.997	1.0e-6	Huge	LIQUID
63	163680	0.0000	0.000	90.00	1460.6	68.177	2.0659	0.0000	.63617	24968.	0.00000	36.996	1.0e-6	Huge	LIQUID
64	166320	0.0000	0.000	90.00	1459.9	68.180	2.0659	0.0000	.63618	24969.	0.00000	36.996	1.0e-6	Huge	LIQUID
65	168960	0.0000	0.000	90.00	1459.3	68.183	2.0660	0.0000	.63618	24969.	0.00000	36.995	1.0e-6	Huge	LIQUID
66	171600	0.0000	0.000	90.00	1458.7	68.186	2.0660	0.0000	.63619	24970.	0.00000	36.994	1.0e-6	Huge	LIQUID
67	174240	0.0000	0.000	90.00	1458.0	68.188	2.0660	0.0000	.63620	24970.	0.00000	36.993	1.0e-6	Huge	LIQUID
68	176880	0.0000	0.000	90.00	1457.4	68.191	2.0661	0.0000	.63620	24971.	0.00000	36.993	1.0e-6	Huge	LIQUID
69	179520	0.0000	0.000	90.00	1456.8	68.194	2.0661	0.0000	.63621	24971.	0.00000	36.992	1.0e-6	Huge	LIQUID
70	182160	0.0000	0.000	90.00	1456.1	68.197	2.0662	0.0000	.63622	24972.	0.00000	36.991	1.0e-6	Huge	LIQUID
71	184800	0.0000	0.000	90.00	1455.5	68.200	2.0662	0.0000	.63622	24972.	0.00000	36.990	1.0e-6	Huge	LIQUID
72	187440	0.0000	0.000	90.00	1454.8	68.203	2.0662	0.0000	.63623	24973.	0.00000	36.990	1.0e-6	Huge	LIQUID
73	190080	0.0000	0.000	90.00	1454.2	68.206	2.0663	0.0000	.63624	24973.	0.00000	36.989	1.0e-6	Huge	LIQUID
74	192720	0.0000	0.000	90.00	1453.6	68.208	2.0663	0.0000	.63624	24974.	0.00000	36.988	1.0e-6	Huge	LIQUID
75	195360	0.0000	0.000	90.00	1452.9	68.211	2.0664	0.0000	.63625	24974.	0.00000	36.988	1.0e-6	Huge	LIQUID
76	198000	0.0000	0.000	90.00	1452.3	68.214	2.0664	0.0000	.63626	24975.	0.00000	36.987	1.0e-6	Huge	LIQUID
77	200640	0.0000	0.000	90.00	1451.7	68.217	2.0665	0.0000	.63627	24975.	0.00000	36.986	1.0e-6	Huge	LIQUID
78	203280	0.0000	0.000	90.00	1451.0	68.220	2.0665	0.0000	.63627	24976.	0.00000	36.985	1.0e-6	Huge	LIQUID
79	205920	0.0000	0.000	90.00	1450.4	68.223	2.0665	0.0000	.63628	24976.	0.00000	36.985	1.0e-6	Huge	LIQUID
80	208560	0.0000	0.000	90.00	1449.8	68.225	2.0666	0.0000	.63629	24977.	0.00000	36.984	1.0e-6	Huge	LIQUID

80	208560	0.0000	0.000	90.00	1449.8	68.225	2.0666	0.0000	.63629	24977.	0.00000	36.984	1.0e-6	Huge LIQUID
81	211200	0.0000	0.000	90.00	1449.1	68.228	2.0666	0.0000	.63629	24977.	0.00000	36.983	1.0e-6	Huge LIQUID
82	213840	0.0000	0.000	90.00	1448.5	68.231	2.0667	0.0000	.63630	24978.	0.00000	36.982	1.0e-6	Huge LIQUID
83	216480	0.0000	0.000	90.00	1447.8	68.234	2.0667	0.0000	.63631	24978.	0.00000	36.982	1.0e-6	Huge LIQUID
84	219120	0.0000	0.000	90.00	1447.2	68.237	2.0667	0.0000	.63631	24979.	0.00000	36.981	1.0e-6	Huge LIQUID
85	221760	0.0000	0.000	90.00	1446.6	68.240	2.0668	0.0000	.63632	24979.	0.00000	36.980	1.0e-6	Huge LIQUID
86	224400	0.0000	0.000	90.00	1445.9	68.243	2.0668	0.0000	.63633	24980.	0.00000	36.980	1.0e-6	Huge LIQUID
87	227040	0.0000	0.000	90.00	1445.3	68.245	2.0669	0.0000	.63633	24980.	0.00000	36.979	1.0e-6	Huge LIQUID
88	229680	0.0000	0.000	90.00	1444.7	68.248	2.0669	0.0000	.63634	24981.	0.00000	36.978	1.0e-6	Huge LIQUID
89	232320	0.0000	0.000	90.00	1444.0	68.251	2.0669	0.0000	.63635	24981.	0.00000	36.977	1.0e-6	Huge LIQUID
90	234960	0.0000	0.000	90.00	1443.4	68.254	2.0670	0.0000	.63635	24982.	0.00000	36.977	1.0e-6	Huge LIQUID
91	237600	0.0000	0.000	90.00	1442.8	68.257	2.0670	0.0000	.63636	24982.	0.00000	36.976	1.0e-6	Huge LIQUID
92	240240	0.0000	0.000	90.00	1442.1	68.260	2.0671	0.0000	.63637	24983.	0.00000	36.975	1.0e-6	Huge LIQUID
93	242880	0.0000	0.000	90.00	1441.5	68.263	2.0671	0.0000	.63637	24983.	0.00000	36.974	1.0e-6	Huge LIQUID
94	245520	0.0000	0.000	90.00	1440.8	68.265	2.0671	0.0000	.63638	24984.	0.00000	36.974	1.0e-6	Huge LIQUID
95	248160	0.0000	0.000	90.00	1440.2	68.268	2.0672	0.0000	.63639	24984.	0.00000	36.973	1.0e-6	Huge LIQUID
96	250800	0.0000	0.000	90.00	1439.6	68.271	2.0672	0.0000	.63640	24985.	0.00000	36.972	1.0e-6	Huge LIQUID
97	253440	0.0000	0.000	90.00	1438.9	68.274	2.0673	0.0000	.63640	24985.	0.00000	36.972	1.0e-6	Huge LIQUID
98	256080	0.0000	0.000	90.00	1438.3	68.277	2.0673	0.0000	.63641	24986.	0.00000	36.971	1.0e-6	Huge LIQUID
99	258720	0.0000	0.000	90.00	1437.7	68.280	2.0673	0.0000	.63642	24986.	0.00000	36.970	1.0e-6	Huge LIQUID
100	261360	0.0000	0.000	90.00	1437.0	68.283	2.0674	0.0000	.63642	24987.	0.00000	36.969	1.0e-6	Huge LIQUID
101	264000	0.0000	0.000	90.00	1436.4	68.285	2.0674	0.0000	.63643	24987.	0.00000	36.969	1.0e-6	Huge LIQUID

Total pressure drop of black oil single phase flow due to 0 feet of elevation is 0 psi

Single phase gas at 0 feet elevation

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Pressure Drop (psi) Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Densities (lb/ft3) Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_1														
1	0.0000	0.0000	0.000	90.00	2500.0	68.000	2.9887	0.0000	0.0000	0.0000	26.0000	.00010	11.778		GAS
2	2640.0	0.0000	0.000	90.00	2499.4	67.983	2.9892	0.0000	.62665	0.0000	26.0000	.00010	11.776	Huge	GAS
3	5280.0	0.0000	0.000	90.00	2498.7	67.965	2.9897	0.0000	.62676	0.0000	26.0000	.00010	11.774	Huge	GAS
4	7920.0	0.0000	0.000	90.00	2498.1	67.948	2.9902	0.0000	.62686	0.0000	26.0000	.00010	11.772	Huge	GAS
5	10560.	0.0000	0.000	90.00	2497.5	67.930	2.9907	0.0000	.62696	0.0000	26.0000	.00010	11.770	Huge	GAS
6	13200.	0.0000	0.000	90.00	2496.9	67.913	2.9912	0.0000	.62707	0.0000	26.0000	.00010	11.768	Huge	GAS
7	15840.	0.0000	0.000	90.00	2496.2	67.895	2.9917	0.0000	.62717	0.0000	26.0000	.00010	11.766	Huge	GAS
8	18480.	0.0000	0.000	90.00	2495.6	67.878	2.9922	0.0000	.62728	0.0000	26.0000	.00010	11.764	Huge	GAS
9	21120.	0.0000	0.000	90.00	2495.0	67.860	2.9927	0.0000	.62738	0.0000	26.0000	.00010	11.762	Huge	GAS
10	23760.	0.0000	0.000	90.00	2494.4	67.843	2.9932	0.0000	.62748	0.0000	26.0000	.00010	11.760	Huge	GAS
11	26400.	0.0000	0.000	90.00	2493.7	67.825	2.9937	0.0000	.62759	0.0000	26.0000	.00010	11.758	Huge	GAS
12	29040.	0.0000	0.000	90.00	2493.1	67.808	2.9943	0.0000	.62769	0.0000	26.0000	.00010	11.756	Huge	GAS
13	31680.	0.0000	0.000	90.00	2492.5	67.790	2.9948	0.0000	.62780	0.0000	26.0000	.00010	11.754	Huge	GAS
14	34320.	0.0000	0.000	90.00	2491.8	67.773	2.9953	0.0000	.62790	0.0000	26.0000	.00010	11.752	Huge	GAS
15	36960.	0.0000	0.000	90.00	2491.2	67.755	2.9958	0.0000	.62801	0.0000	26.0000	.00010	11.750	Huge	GAS
16	39600.	0.0000	0.000	90.00	2490.6	67.738	2.9963	0.0000	.62811	0.0000	26.0000	.00010	11.748	Huge	GAS
17	42240.	0.0000	0.000	90.00	2490.0	67.720	2.9968	0.0000	.62822	0.0000	26.0000	.00010	11.746	Huge	GAS
18	44880.	0.0000	0.000	90.00	2489.3	67.702	2.9973	0.0000	.62832	0.0000	26.0000	.00010	11.744	Huge	GAS
19	47520.	0.0000	0.000	90.00	2488.7	67.685	2.9978	0.0000	.62843	0.0000	26.0000	.00010	11.742	Huge	GAS
20	50160.	0.0000	0.000	90.00	2488.1	67.667	2.9983	0.0000	.62853	0.0000	26.0000	.00010	11.740	Huge	GAS
21	52800.	0.0000	0.000	90.00	2487.4	67.650	2.9989	0.0000	.62864	0.0000	26.0000	.00010	11.738	Huge	GAS
22	55440.	0.0000	0.000	90.00	2486.8	67.632	2.9994	0.0000	.62874	0.0000	26.0000	.00010	11.736	Huge	GAS
23	58080.	0.0000	0.000	90.00	2486.2	67.615	2.9999	0.0000	.62885	0.0000	26.0000	.00010	11.734	Huge	GAS
24	60720.	0.0000	0.000	90.00	2485.6	67.597	3.0004	0.0000	.62895	0.0000	26.0000	.00010	11.732	Huge	GAS
25	63360.	0.0000	0.000	90.00	2484.9	67.580	3.0009	0.0000	.62906	0.0000	26.0000	.00010	11.730	Huge	GAS
26	66000.	0.0000	0.000	90.00	2484.3	67.562	3.0014	0.0000	.62916	0.0000	26.0000	.00010	11.728	Huge	GAS
27	68640.	0.0000	0.000	90.00	2483.7	67.545	3.0019	0.0000	.62927	0.0000	26.0000	.00010	11.726	Huge	GAS
28	71280.	0.0000	0.000	90.00	2483.0	67.527	3.0024	0.0000	.62937	0.0000	26.0000	.00010	11.724	Huge	GAS
29	73920.	0.0000	0.000	90.00	2482.4	67.509	3.0030	0.0000	.62948	0.0000	26.0000	.00010	11.722	Huge	GAS
30	76560.	0.0000	0.000	90.00	2481.8	67.492	3.0035	0.0000	.62958	0.0000	26.0000	.00010	11.720	Huge	GAS
31	79200.	0.0000	0.000	90.00	2481.2	67.474	3.0040	0.0000	.62969	0.0000	26.0000	.00010	11.718	Huge	GAS
32	81840.	0.0000	0.000	90.00	2480.5	67.457	3.0045	0.0000	.62979	0.0000	26.0000	.00010	11.716	Huge	GAS
33	84480.	0.0000	0.000	90.00	2479.9	67.439	3.0050	0.0000	.62990	0.0000	26.0000	.00010	11.714	Huge	GAS
34	87120.	0.0000	0.000	90.00	2479.3	67.422	3.0055	0.0000	.63001	0.0000	26.0000	.00010	11.712	Huge	GAS
35	89760.	0.0000	0.000	90.00	2478.6	67.404	3.0061	0.0000	.63011	0.0000	26.0000	.00010	11.710	Huge	GAS
36	92400.	0.0000	0.000	90.00	2478.0	67.386	3.0066	0.0000	.63022	0.0000	26.0000	.00010	11.708	Huge	GAS
37	95040.	0.0000	0.000	90.00	2477.4	67.369	3.0071	0.0000	.63032	0.0000	26.0000	.00010	11.706	Huge	GAS
38	97680.	0.0000	0.000	90.00	2476.7	67.351	3.0076	0.0000	.63043	0.0000	26.0000	.00010	11.704	Huge	GAS
39	100320	0.0000	0.000	90.00	2476.1	67.334	3.0081	0.0000	.63054	0.0000	26.0000	.00010	11.701	Huge	GAS
40	102960	0.0000	0.000	90.00	2475.5	67.316	3.0086	0.0000	.63064	0.0000	26.0000	.00010	11.699	Huge	GAS
41	105600	0.0000	0.000	90.00	2474.9	67.298	3.0092	0.0000	.63075	0.0000	26.0000	.00010	11.697	Huge	GAS
42	108240	0.0000	0.000	90.00	2474.2	67.281	3.0097	0.0000	.63085	0.0000	26.0000	.00010	11.695	Huge	GAS
43	110880	0.0000	0.000	90.00	2473.6	67.263	3.0102	0.0000	.63096	0.0000	26.0000	.00010	11.693	Huge	GAS
44	113520	0.0000	0.000	90.00	2473.0	67.245	3.0107	0.0000	.63107	0.0000	26.0000	.00010	11.691	Huge	GAS
45	116160	0.0000	0.000	90.00	2472.3	67.228	3.0112	0.0000	.63117	0.0000	26.0000	.00010	11.689	Huge	GAS
46	118800	0.0000	0.000	90.00	2471.7	67.210	3.0118	0.0000	.63128	0.0000	26.0000	.00010	11.687	Huge	GAS
47	121440	0.0000	0.000	90.00	2471.1	67.193	3.0123	0.0000	.63139	0.0000	26.0000	.00010	11.685	Huge	GAS
48	124080	0.0000	0.000	90.00	2470.4	67.175	3.0128	0.0000	.63149	0.0000	26.0000	.00010	11.683	Huge	GAS
49	126720	0.0000	0.000	90.00	2469.8	67.157	3.0133	0.0000	.63160	0.0000	26.0000	.00010	11.681	Huge	GAS
50	129360	0.0000	0.000	90.00	2469.2	67.140	3.0138	0.0000	.63171	0.0000	26.0000	.00010	11.679	Huge	GAS
51	132000	0.0000	0.000	90.00	2468.5	67.122	3.0144	0.0000	.63181	0.0000	26.0000	.00010	11.677	Huge	GAS
52	134640	0.0000	0.000	90.00	2467.9	67.104	3.0149	0.0000	.63192	0.0000	26.0000	.00010	11.675	Huge	GAS
53	137280	0.0000	0.000	90.00	2467.3	67.087	3.0154	0.0000	.63203	0.0000	26.0000	.00010	11.673	Huge	GAS
54	139920	0.0000	0.000	90.00	2466.6	67.069	3.0159	0.0000	.63214	0.0000	26.0000	.00010	11.671	Huge	GAS
55	142560	0.0000	0.000	90.00	2466.0	67.051	3.0164	0.0000	.63224	0.0000	26.0000	.00010	11.669	Huge	GAS
56	145200	0.0000	0.000	90.00	2465.4	67.034	3.0170	0.0000	.63235	0.0000	26.0000	.00010	11.667	Huge	GAS
57	147840	0.0000	0.000	90.00	2464.7	67.016	3.0175	0.0000	.63246	0.0000	26.0000	.00010	11.665	Huge	GAS
58	150480	0.0000	0.000	90.00	2464.1	66.998	3.0180	0.0000	.63256	0.0000	26.0000	.00010	11.663	Huge	GAS
59	153120	0.0000	0.000	90.00	2463.5	66.981	3.0185	0.0000	.63267	0.0000	26.0000	.00010	11.661	Huge	GAS
60	155760	0.0000	0.000	90.00	2462.8	66.963	3.0191	0.0000	.63278	0.0000	26.0000	.00010	11.659	Huge	GAS
61	158400	0.0000	0.000	90.00	2462.2	66.945	3.0196	0.0000	.63289	0.0000	26.0000	.00010	11.657	Huge	GAS
62	161040	0.0000	0.000	90.00	2461.6	66.928	3.0201	0.0000	.63299	0.0000	26.0000	.00010	11.655	Huge	GAS
63	163680	0.0000	0.000	90.00	2460.9	66.910	3.0206	0.0000	.63310	0.0000	26.0000	.00010	11.653	Huge	GAS
64	166320	0.0000	0.000	90.00	2460.3	66.892	3.0212	0.0000	.63321	0.0000	26.0000	.00010	11.651	Huge	GAS
65	168960	0.0000	0.000	90.00	2459.7	66.875	3.0217	0.0000	.63332	0.0000	26.0000	.00010	11.649	Huge	GAS
66	171600	0.0000	0.000	90.00	2459.0	66.857	3.0222	0.0000	.63343	0.0000	26.0000	.00010	11.647	Huge	GAS
67	174240	0.0000	0.000	90.00	2458.4	66.839	3.0227	0.0000	.63353	0.0000	26.0000	.00010	11.645	Huge	GAS
68	176880	0.0000	0.000	90.00	2457.8	66.821	3.0233	0.0000	.63364	0.0000	26.0000	.00010	11.643	Huge	GAS
69	179520	0.0000	0.000	90.00	2457.1	66.804	3.0238	0.0000	.63375	0.0000	26.0000	.00010	11.641	Huge	GAS
70	182160	0.0000	0.000	90.00	2456.5	66.786	3.0243	0.0000	.63386	0.0000	26.0000	.00010	11.639	Huge	GAS
71	184800	0.0000	0.000	90.00	2455.9	66.768	3.0249	0.0000	.63397	0.0000	26.0000	.00010	11.637	Huge	GAS
72	187440	0.0000	0.000	90.00	2455.2	66.751	3.0254	0.0000	.63407	0.0000	26.0000	.00010	11.635	Huge	GAS
73	190080	0.0000	0.000	90.00	2454.6	66.733	3.0259	0.0000	.63418	0.0000	26.0000	.00010	11.633	Huge	GAS
74	192720	0.0000	0.000	90.00	2454.0	66.715	3.0264	0.0000	.63429	0.0000	26.0000	.00010	11.631	Huge	GAS
75	195360	0.0000	0.000	90.00	2453.3	66.697	3.0270	0.0000	.63440	0.0000	26.0000	.00010	11.629	Huge	GAS
76	198000	0.0000	0.000	90.00	2452.7	66.680	3.0275	0.0000	.63451	0.0000	26.0000	.00010	11.627	Huge	GAS
77	200640	0.0000	0.000	90.00	2452.1	66.662	3.0280	0.0000	.63462	0.0000	26.0000	.00010	11.625	Huge	GAS
78	203280	0.0000	0.000	90.00	2451.4	66.644	3.0286	0.0000	.63473	0.0000	26.0000	.00010	11.623	Huge	GAS
79	205920	0.0000	0.000	90.00	2450.8	66.626	3.0291	0.0000	.63483	0.0000	26.0000	.00010	11.620	Huge	GAS
80	208560	0.0000	0.000	90.00	2450.2	66.609	3.0296	0.0000	.63494	0.0000	26.0000	.00010	11.618	Huge	GAS

81	211200	0.0000	0.000	90.00	2449.5	66.591	3.0302	0.0000	.63505	0.0000	26.0000	.00010	11.616	Huge GAS
82	213840	0.0000	0.000	90.00	2448.9	66.573	3.0307	0.0000	.63516	0.0000	26.0000	.00010	11.614	Huge GAS
83	216480	0.0000	0.000	90.00	2448.3	66.555	3.0312	0.0000	.63527	0.0000	26.0000	.00010	11.612	Huge GAS
84	219120	0.0000	0.000	90.00	2447.6	66.538	3.0317	0.0000	.63538	0.0000	26.0000	.00010	11.610	Huge GAS
85	221760	0.0000	0.000	90.00	2447.0	66.520	3.0323	0.0000	.63549	0.0000	26.0000	.00010	11.608	Huge GAS
86	224400	0.0000	0.000	90.00	2446.4	66.502	3.0328	0.0000	.63560	0.0000	26.0000	.00010	11.606	Huge GAS
87	227040	0.0000	0.000	90.00	2445.7	66.484	3.0333	0.0000	.63571	0.0000	26.0000	.00010	11.604	Huge GAS
88	229680	0.0000	0.000	90.00	2445.1	66.467	3.0339	0.0000	.63582	0.0000	26.0000	.00010	11.602	Huge GAS
89	232320	0.0000	0.000	90.00	2444.4	66.449	3.0344	0.0000	.63593	0.0000	26.0000	.00010	11.600	Huge GAS
90	234960	0.0000	0.000	90.00	2443.8	66.431	3.0350	0.0000	.63604	0.0000	26.0000	.00010	11.598	Huge GAS
91	237600	0.0000	0.000	90.00	2443.2	66.413	3.0355	0.0000	.63614	0.0000	26.0000	.00010	11.596	Huge GAS
92	240240	0.0000	0.000	90.00	2442.5	66.395	3.0360	0.0000	.63625	0.0000	26.0000	.00010	11.594	Huge GAS
93	242880	0.0000	0.000	90.00	2441.9	66.378	3.0366	0.0000	.63636	0.0000	26.0000	.00010	11.592	Huge GAS
94	245520	0.0000	0.000	90.00	2441.3	66.360	3.0371	0.0000	.63647	0.0000	26.0000	.00010	11.590	Huge GAS
95	248160	0.0000	0.000	90.00	2440.6	66.342	3.0376	0.0000	.63658	0.0000	26.0000	.00010	11.588	Huge GAS
96	250800	0.0000	0.000	90.00	2440.0	66.324	3.0382	0.0000	.63669	0.0000	26.0000	.00010	11.586	Huge GAS
97	253440	0.0000	0.000	90.00	2439.4	66.306	3.0387	0.0000	.63680	0.0000	26.0000	.00010	11.584	Huge GAS
98	256080	0.0000	0.000	90.00	2438.7	66.288	3.0392	0.0000	.63691	0.0000	26.0000	.00010	11.582	Huge GAS
99	258720	0.0000	0.000	90.00	2438.1	66.271	3.0398	0.0000	.63702	0.0000	26.0000	.00010	11.580	Huge GAS
100	261360	0.0000	0.000	90.00	2437.4	66.253	3.0403	0.0000	.63713	0.0000	26.0000	.00010	11.578	Huge GAS
101	264000	0.0000	0.000	90.00	2436.8	66.235	3.0408	0.0000	.63724	0.0000	26.0000	.00010	11.576	Huge GAS

Total pressure drop of single phase gas flow due to 0 feet of elevation is 0 psi

Multiphase flow at 0 feet of elevation

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Pressure Drop (psi) Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Densities (lb/ft3) Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_2														
1	0.0000	0.0000	0.000	90.00	3600.0	68.000	.98282	0.0000	0.0000	10834.	2.00257	56.687	19.541		B/B TRANSITION
2	2640.0	0.0000	0.000	90.00	3599.4	68.001	.98283	0.0000	.63346	10834.	2.00300	56.688	19.540	3.83	B/B TRANSITION
3	5280.0	0.0000	0.000	90.00	3598.7	68.004	.98284	0.0000	.63355	10834.	2.00343	56.689	19.538	1.91	B/B TRANSITION
4	7920.0	0.0000	0.000	90.00	3598.1	68.005	.98285	0.0000	.63364	10834.	2.00387	56.689	19.537	1.28	B/B TRANSITION
5	10560.	0.0000	0.000	90.00	3597.5	68.007	.98286	0.0000	.63373	10833.	2.00430	56.690	19.535	0.96	B/B TRANSITION
6	13200.	0.0000	0.000	90.00	3596.8	68.009	.98288	0.0000	.63382	10833.	2.00473	56.690	19.534	0.77	B/B TRANSITION
7	15840.	0.0000	0.000	90.00	3596.2	68.011	.98289	0.0000	.63391	10833.	2.00516	56.691	19.533	0.64	B/B TRANSITION
8	18480.	0.0000	0.000	90.00	3595.6	68.012	.98290	0.0000	.63400	10833.	2.00560	56.691	19.531	0.55	B/B TRANSITION
9	21120.	0.0000	0.000	90.00	3594.9	68.014	.98291	0.0000	.63408	10833.	2.00603	56.692	19.530	0.48	B/B TRANSITION
10	23760.	0.0000	0.000	90.00	3594.3	68.015	.98292	0.0000	.63417	10832.	2.00646	56.692	19.528	0.43	B/B TRANSITION
11	26400.	0.0000	0.000	90.00	3593.7	68.017	.98293	0.0000	.63426	10832.	2.00689	56.693	19.527	0.38	B/B TRANSITION
12	29040.	0.0000	0.000	90.00	3593.0	68.019	.98294	0.0000	.63435	10832.	2.00733	56.694	19.526	0.35	B/B TRANSITION
13	31680.	0.0000	0.000	90.00	3592.4	68.020	.98295	0.0000	.63444	10832.	2.00775	56.694	19.524	0.32	B/B TRANSITION
14	34320.	0.0000	0.000	90.00	3591.8	68.021	.98296	0.0000	.63453	10832.	2.00818	56.695	19.523	0.29	B/B TRANSITION
15	36960.	0.0000	0.000	90.00	3591.1	68.022	.98298	0.0000	.63462	10831.	2.00861	56.695	19.521	0.27	B/B TRANSITION
16	39600.	0.0000	0.000	90.00	3590.5	68.024	.98299	0.0000	.63470	10831.	2.00905	56.696	19.520	0.26	B/B TRANSITION
17	42240.	0.0000	0.000	90.00	3589.9	68.025	.98300	0.0000	.63479	10831.	2.00948	56.696	19.519	0.24	B/B TRANSITION
18	44880.	0.0000	0.000	90.00	3589.2	68.027	.98301	0.0000	.63488	10831.	2.00991	56.697	19.517	0.23	B/B TRANSITION
19	47520.	0.0000	0.000	90.00	3588.6	68.028	.98302	0.0000	.63497	10831.	2.01034	56.698	19.516	0.21	B/B TRANSITION
20	50160.	0.0000	0.000	90.00	3587.9	68.029	.98303	0.0000	.63506	10831.	2.01077	56.698	19.514	0.20	B/B TRANSITION
21	52800.	0.0000	0.000	90.00	3587.3	68.031	.98304	0.0000	.63515	10830.	2.01120	56.699	19.513	0.19	B/B TRANSITION
22	55440.	0.0000	0.000	90.00	3586.7	68.032	.98305	0.0000	.63524	10830.	2.01163	56.699	19.512	0.18	B/B TRANSITION
23	58080.	0.0000	0.000	90.00	3586.0	68.033	.98306	0.0000	.63532	10830.	2.01206	56.700	19.510	0.17	B/B TRANSITION
24	60720.	0.0000	0.000	90.00	3585.4	68.035	.98308	0.0000	.63541	10830.	2.01249	56.700	19.509	0.17	B/B TRANSITION
25	63360.	0.0000	0.000	90.00	3584.8	68.036	.98309	0.0000	.63550	10830.	2.01292	56.701	19.508	0.16	B/B TRANSITION
26	66000.	0.0000	0.000	90.00	3584.1	68.037	.98310	0.0000	.63559	10829.	2.01335	56.702	19.506	0.15	B/B TRANSITION
27	68640.	0.0000	0.000	90.00	3583.5	68.038	.98311	0.0000	.63568	10829.	2.01378	56.702	19.505	0.15	B/B TRANSITION
28	71280.	0.0000	0.000	90.00	3582.9	68.040	.98312	0.0000	.63577	10829.	2.01421	56.703	19.503	0.14	B/B TRANSITION
29	73920.	0.0000	0.000	90.00	3582.2	68.041	.98313	0.0000	.63586	10829.	2.01464	56.703	19.502	0.14	B/B TRANSITION
30	76560.	0.0000	0.000	90.00	3581.6	68.042	.98314	0.0000	.63594	10829.	2.01508	56.704	19.501	0.13	B/B TRANSITION
31	79200.	0.0000	0.000	90.00	3581.0	68.043	.98315	0.0000	.63603	10828.	2.01550	56.704	19.499	0.13	B/B TRANSITION
32	81840.	0.0000	0.000	90.00	3580.3	68.044	.98316	0.0000	.63612	10828.	2.01594	56.705	19.498	0.12	B/B TRANSITION
33	84480.	0.0000	0.000	90.00	3579.7	68.046	.98318	0.0000	.63621	10828.	2.01637	56.706	19.496	0.12	B/B TRANSITION
34	87120.	0.0000	0.000	90.00	3579.0	68.047	.98319	0.0000	.63630	10828.	2.01680	56.706	19.495	0.12	B/B TRANSITION
35	89760.	0.0000	0.000	90.00	3578.4	68.047	.98320	0.0000	.63639	10828.	2.01722	56.707	19.494	0.11	B/B TRANSITION
36	92400.	0.0000	0.000	90.00	3577.8	68.048	.98321	0.0000	.63648	10827.	2.01766	56.707	19.492	0.11	B/B TRANSITION
37	95040.	0.0000	0.000	90.00	3577.1	68.050	.98322	0.0000	.63656	10827.	2.01809	56.708	19.491	0.11	B/B TRANSITION
38	97680.	0.0000	0.000	90.00	3576.5	68.051	.98323	0.0000	.63665	10827.	2.01852	56.708	19.489	0.10	B/B TRANSITION
39	100320	0.0000	0.000	90.00	3575.9	68.052	.98324	0.0000	.63674	10827.	2.01895	56.709	19.488	0.10	B/B TRANSITION
40	102960	0.0000	0.000	90.00	3575.2	68.052	.98325	0.0000	.63683	10827.	2.01937	56.710	19.487	0.10	B/B TRANSITION
41	105600	0.0000	0.000	90.00	3574.6	68.053	.98326	0.0000	.63692	10826.	2.01981	56.710	19.485	0.10	B/B TRANSITION
42	108240	0.0000	0.000	90.00	3574.0	68.054	.98327	0.0000	.63701	10826.	2.02024	56.711	19.484	0.09	B/B TRANSITION
43	110880	0.0000	0.000	90.00	3573.3	68.056	.98329	0.0000	.63710	10826.	2.02067	56.711	19.483	0.09	B/B TRANSITION
44	113520	0.0000	0.000	90.00	3572.7	68.056	.98330	0.0000	.63718	10826.	2.02109	56.712	19.481	0.09	B/B TRANSITION
45	116160	0.0000	0.000	90.00	3572.0	68.057	.98331	0.0000	.63727	10826.	2.02153	56.712	19.480	0.09	B/B TRANSITION
46	118800	0.0000	0.000	90.00	3571.4	68.058	.98332	0.0000	.63736	10825.	2.02196	56.713	19.478	0.09	B/B TRANSITION
47	121440	0.0000	0.000	90.00	3570.8	68.058	.98333	0.0000	.63745	10825.	2.02238	56.714	19.477	0.08	B/B TRANSITION
48	124080	0.0000	0.000	90.00	3570.1	68.059	.98334	0.0000	.63754	10825.	2.02282	56.714	19.476	0.08	B/B TRANSITION
49	126720	0.0000	0.000	90.00	3569.5	68.061	.98335	0.0000	.63763	10825.	2.02325	56.715	19.474	0.08	B/B TRANSITION
50	129360	0.0000	0.000	90.00	3568.9	68.061	.98336	0.0000	.63772	10825.	2.02367	56.715	19.473	0.08	B/B TRANSITION
51	132000	0.0000	0.000	90.00	3568.2	68.062	.98337	0.0000	.63781	10824.	2.02410	56.716	19.472	0.08	B/B TRANSITION
52	134640	0.0000	0.000	90.00	3567.6	68.063	.98338	0.0000	.63790	10824.	2.02454	56.716	19.470	0.08	B/B TRANSITION
53	137280	0.0000	0.000	90.00	3566.9	68.063	.98339	0.0000	.63798	10824.	2.02496	56.717	19.469	0.07	B/B TRANSITION
54	139920	0.0000	0.000	90.00	3566.3	68.064	.98341	0.0000	.63807	10824.	2.02539	56.718	19.467	0.07	B/B TRANSITION
55	142560	0.0000	0.000	90.00	3565.7	68.065	.98342	0.0000	.63816	10824.	2.02582	56.718	19.466	0.07	B/B TRANSITION
56	145200	0.0000	0.000	90.00	3565.0	68.065	.98343	0.0000	.63825	10824.	2.02625	56.719	19.465	0.07	B/B TRANSITION
57	147840	0.0000	0.000	90.00	3564.4	68.067	.98344	0.0000	.63834	10823.	2.02668	56.719	19.463	0.07	B/B TRANSITION
58	150480	0.0000	0.000	90.00	3563.8	68.067	.98345	0.0000	.63843	10823.	2.02711	56.720	19.462	0.07	B/B TRANSITION
59	153120	0.0000	0.000	90.00	3563.1	68.068	.98346	0.0000	.63852	10823.	2.02754	56.720	19.460	0.07	B/B TRANSITION
60	155760	0.0000	0.000	90.00	3562.5	68.069	.98347	0.0000	.63861	10823.	2.02797	56.721	19.459	0.06	B/B TRANSITION
61	158400	0.0000	0.000	90.00	3561.8	68.069	.98348	0.0000	.63870	10823.	2.02840	56.722	19.458	0.06	B/B TRANSITION
62	161040	0.0000	0.000	90.00	3561.2	68.070	.98349	0.0000	.63878	10822.	2.02883	56.722	19.456	0.06	B/B TRANSITION
63	163680	0.0000	0.000	90.00	3560.6	68.070	.98351	0.0000	.63887	10822.	2.02925	56.723	19.455	0.06	B/B TRANSITION
64	166320	0.0000	0.000	90.00	3559.9	68.071	.98352	0.0000	.63896	10822.	2.02969	56.723	19.454	0.06	B/B TRANSITION
65	168960	0.0000	0.000	90.00	3559.3	68.071	.98353	0.0000	.63905	10822.	2.03011	56.724	19.452	0.06	B/B TRANSITION
66	171600	0.0000	0.000	90.00	3558.6	68.073	.98354	0.0000	.63914	10822.	2.03055	56.725	19.451	0.06	B/B TRANSITION
67	174240	0.0000	0.000	90.00	3558.0	68.073	.98355	0.0000	.63923	10821.	2.03097	56.725	19.449	0.06	B/B TRANSITION
68	176880	0.0000	0.000	90.00	3557.4	68.074	.98356	0.0000	.63932	10821.	2.03141	56.726	19.448	0.06	B/B TRANSITION
69	179520	0.0000	0.000	90.00	3556.7	68.074	.98357	0.0000	.63941	10821.	2.03183	56.726	19.447	0.06	B/B TRANSITION
70	182160	0.0000	0.000	90.00	3556.1	68.075	.98358	0.0000	.63950	10821.	2.03226	56.727	19.445	0.06	B/B TRANSITION
71	184800	0.0000	0.000	90.00	3555.4	68.075	.98359	0.0000	.63959	10821.	2.03269	56.727	19.444	0.05	B/B TRANSITION
72	187440	0.0000	0.000	90.00	3554.8	68.076	.98360	0.0000	.63968	10820.	2.03312	56.728	19.443	0.05	B/B TRANSITION
73	190080	0.0000	0.000	90.00	3554.2	68.076	.98361	0.0000	.63977	10820.	2.03355	56.729	19.441	0.05	B/B TRANSITION
74	192720	0.0000	0.000	90.00	3553.5	68.077	.98363	0.0000	.63985	10820.	2.03398	56.729	19.440	0.05	B/B TRANSITION
75	195360	0.0000	0.000	90.00	3552.9	68.077	.98364	0.0000	.63994	10820.	2.03440	56.730	19.438	0.05	B/B TRANSITION
76	198000	0.0000	0.000	90.00	3552.2	68.077	.98365	0.0000	.64003	10820.	2.03483	56.730	19.437	0.05	B/B TRANSITION
77	200640	0.0000	0.000	90.00	3551.6	68.078	.98366	0.0000	.64012	10819.	2.03527	56.731	19.436	0.05	B/B TRANSITION
78	203280	0.0000	0.000	90.00	3551.0	68.078	.98367	0.0000	.64021	10819.	2.03569	56.731	19.434	0.05	B/B TRANSITION
79	205920	0.0000	0.000	90.00	3550.3	68.080	.98368	0.0000	.64030	10819.	2.03613	56.732	19.433	0.05	B/B TRANSITION
80	208560	0.0000	0.000	90.00	3549.7	68.080	.98369	0.0000	.64039	10819.	2.03655	56.733	19.432	0.05	B/B TRANSITION

81	211200	0.0000	0.000	90.00	3549.0	68.080	.98370	0.0000	.64048	10819.	2.03698	56.733	19.430	0.05 B/B TRANSITION
82	213840	0.0000	0.000	90.00	3548.4	68.081	.98371	0.0000	.64057	10818.	2.03741	56.734	19.429	0.05 B/B TRANSITION
83	216480	0.0000	0.000	90.00	3547.8	68.081	.98372	0.0000	.64066	10818.	2.03784	56.734	19.427	0.05 B/B TRANSITION
84	219120	0.0000	0.000	90.00	3547.1	68.082	.98374	0.0000	.64075	10818.	2.03827	56.735	19.426	0.05 B/B TRANSITION
85	221760	0.0000	0.000	90.00	3546.5	68.082	.98375	0.0000	.64084	10818.	2.03870	56.736	19.425	0.05 B/B TRANSITION
86	224400	0.0000	0.000	90.00	3545.8	68.082	.98376	0.0000	.64093	10818.	2.03912	56.736	19.423	0.04 B/B TRANSITION
87	227040	0.0000	0.000	90.00	3545.2	68.083	.98377	0.0000	.64102	10817.	2.03956	56.737	19.422	0.04 B/B TRANSITION
88	229680	0.0000	0.000	90.00	3544.6	68.083	.98378	0.0000	.64111	10817.	2.03999	56.737	19.421	0.04 B/B TRANSITION
89	232320	0.0000	0.000	90.00	3543.9	68.083	.98379	0.0000	.64120	10817.	2.04041	56.738	19.419	0.04 B/B TRANSITION
90	234960	0.0000	0.000	90.00	3543.3	68.084	.98380	0.0000	.64129	10817.	2.04084	56.738	19.418	0.04 B/B TRANSITION
91	237600	0.0000	0.000	90.00	3542.6	68.084	.98381	0.0000	.64138	10817.	2.04127	56.739	19.416	0.04 B/B TRANSITION
92	240240	0.0000	0.000	90.00	3542.0	68.084	.98382	0.0000	.64147	10817.	2.04170	56.740	19.415	0.04 B/B TRANSITION
93	242880	0.0000	0.000	90.00	3541.4	68.086	.98384	0.0000	.64156	10816.	2.04213	56.740	19.414	0.04 B/B TRANSITION
94	245520	0.0000	0.000	90.00	3540.7	68.086	.98385	0.0000	.64165	10816.	2.04256	56.741	19.412	0.04 B/B TRANSITION
95	248160	0.0000	0.000	90.00	3540.1	68.086	.98386	0.0000	.64174	10816.	2.04299	56.741	19.411	0.04 B/B TRANSITION
96	250800	0.0000	0.000	90.00	3539.4	68.087	.98387	0.0000	.64183	10816.	2.04342	56.742	19.409	0.04 B/B TRANSITION
97	253440	0.0000	0.000	90.00	3538.8	68.087	.98388	0.0000	.64192	10816.	2.04385	56.743	19.408	0.04 B/B TRANSITION
98	256080	0.0000	0.000	90.00	3538.1	68.087	.98389	0.0000	.64201	10815.	2.04427	56.743	19.407	0.04 B/B TRANSITION
99	258720	0.0000	0.000	90.00	3537.5	68.087	.98390	0.0000	.64210	10815.	2.04471	56.744	19.405	0.04 B/B TRANSITION
100	261360	0.0000	0.000	90.00	3536.9	68.088	.98391	0.0000	.64219	10815.	2.04514	56.744	19.404	0.04 B/B TRANSITION
101	264000	0.0000	0.000	90.00	3536.2	68.088	.98392	0.0000	.64228	10815.	2.04556	56.745	19.403	0.04 B/B TRANSITION

Total pressure drop of multiphase flow due to 0 feet of elevation is 0 psi

Single phase black oil at +1300 feet of elevation

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Pressure Drop (psi) Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Densities (lb/ft3) Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_1														
1	0.0000	0.0000	.2821	89.72	1500.0	68.000	2.0634	0.0000	0.0000	24938.	0.00000	37.041	1.0e-6		LIQUID
2	2640.0	13.000	.2821	89.72	1496.0	67.989	2.0636	3.3438	.63578	24940.	0.00000	37.038	1.0e-6	Huge	LIQUID
3	5280.0	26.000	.2821	89.72	1492.0	67.978	2.0638	3.3435	.63581	24943.	0.00000	37.034	1.0e-6	Huge	LIQUID
4	7920.0	39.000	.2821	89.72	1488.1	67.966	2.0640	3.3432	.63585	24945.	0.00000	37.031	1.0e-6	Huge	LIQUID
5	10560.	52.000	.2821	89.72	1484.1	67.955	2.0642	3.3429	.63589	24948.	0.00000	37.027	1.0e-6	Huge	LIQUID
6	13200.	65.000	.2821	89.72	1480.1	67.944	2.0644	3.3426	.63592	24950.	0.00000	37.024	1.0e-6	Huge	LIQUID
7	15840.	78.000	.2821	89.72	1476.1	67.933	2.0646	3.3423	.63596	24952.	0.00000	37.020	1.0e-6	Huge	LIQUID
8	18480.	91.000	.2821	89.72	1472.1	67.921	2.0647	3.3419	.63599	24955.	0.00000	37.017	1.0e-6	Huge	LIQUID
9	21120.	104.00	.2821	89.72	1468.2	67.910	2.0649	3.3416	.63603	24957.	0.00000	37.013	1.0e-6	Huge	LIQUID
10	23760.	117.00	.2821	89.72	1464.2	67.899	2.0651	3.3413	.63607	24960.	0.00000	37.010	1.0e-6	Huge	LIQUID
11	26400.	130.00	.2821	89.72	1460.2	67.887	2.0653	3.3410	.63610	24962.	0.00000	37.006	1.0e-6	Huge	LIQUID
12	29040.	143.00	.2821	89.72	1456.2	67.876	2.0655	3.3407	.63614	24964.	0.00000	37.002	1.0e-6	Huge	LIQUID
13	31680.	156.00	.2821	89.72	1452.3	67.865	2.0657	3.3403	.63618	24967.	0.00000	36.999	1.0e-6	Huge	LIQUID
14	34320.	169.00	.2821	89.72	1448.3	67.854	2.0659	3.3400	.63621	24969.	0.00000	36.995	1.0e-6	Huge	LIQUID
15	36960.	182.00	.2821	89.72	1444.3	67.843	2.0661	3.3397	.63625	24971.	0.00000	36.992	1.0e-6	Huge	LIQUID
16	39600.	195.00	.2821	89.72	1440.3	67.831	2.0663	3.3394	.63628	24974.	0.00000	36.988	1.0e-6	Huge	LIQUID
17	42240.	208.00	.2821	89.72	1436.4	67.820	2.0665	3.3391	.63632	24976.	0.00000	36.985	1.0e-6	Huge	LIQUID
18	44880.	221.00	.2821	89.72	1432.4	67.809	2.0667	3.3388	.63636	24979.	0.00000	36.981	1.0e-6	Huge	LIQUID
19	47520.	234.00	.2821	89.72	1428.4	67.798	2.0669	3.3384	.63639	24981.	0.00000	36.978	1.0e-6	Huge	LIQUID
20	50160.	247.00	.2821	89.72	1424.4	67.787	2.0671	3.3381	.63643	24983.	0.00000	36.974	1.0e-6	Huge	LIQUID
21	52800.	260.00	.2821	89.72	1420.5	67.775	2.0673	3.3378	.63646	24986.	0.00000	36.971	1.0e-6	Huge	LIQUID
22	55440.	273.00	.2821	89.72	1416.5	67.764	2.0675	3.3375	.63650	24988.	0.00000	36.967	1.0e-6	Huge	LIQUID
23	58080.	286.00	.2821	89.72	1412.5	67.753	2.0677	3.3372	.63654	24990.	0.00000	36.964	1.0e-6	Huge	LIQUID
24	60720.	299.00	.2821	89.72	1408.5	67.742	2.0679	3.3368	.63657	24993.	0.00000	36.960	1.0e-6	Huge	LIQUID
25	63360.	312.00	.2821	89.72	1404.6	67.730	2.0681	3.3365	.63661	24995.	0.00000	36.957	1.0e-6	Huge	LIQUID
26	66000.	325.00	.2821	89.72	1400.6	67.719	2.0683	3.3362	.63665	24998.	0.00000	36.953	1.0e-6	Huge	LIQUID
27	68640.	338.00	.2821	89.72	1396.6	67.708	2.0685	3.3359	.63668	25000.	0.00000	36.950	1.0e-6	Huge	LIQUID
28	71280.	351.00	.2821	89.72	1392.7	67.697	2.0687	3.3356	.63672	25002.	0.00000	36.946	1.0e-6	Huge	LIQUID
29	73920.	364.00	.2821	89.72	1388.7	67.686	2.0689	3.3353	.63675	25005.	0.00000	36.943	1.0e-6	Huge	LIQUID
30	76560.	377.00	.2821	89.72	1384.7	67.675	2.0691	3.3349	.63679	25007.	0.00000	36.939	1.0e-6	Huge	LIQUID
31	79200.	390.00	.2821	89.72	1380.7	67.664	2.0693	3.3346	.63683	25010.	0.00000	36.936	1.0e-6	Huge	LIQUID
32	81840.	403.00	.2821	89.72	1376.8	67.652	2.0695	3.3343	.63686	25012.	0.00000	36.932	1.0e-6	Huge	LIQUID
33	84480.	416.00	.2821	89.72	1372.8	67.641	2.0697	3.3340	.63690	25014.	0.00000	36.929	1.0e-6	Huge	LIQUID
34	87120.	429.00	.2821	89.72	1368.8	67.630	2.0699	3.3337	.63693	25017.	0.00000	36.925	1.0e-6	Huge	LIQUID
35	89760.	442.00	.2821	89.72	1364.9	67.619	2.0701	3.3334	.63697	25019.	0.00000	36.922	1.0e-6	Huge	LIQUID
36	92400.	455.00	.2821	89.72	1360.9	67.608	2.0703	3.3330	.63701	25021.	0.00000	36.918	1.0e-6	Huge	LIQUID
37	95040.	468.00	.2821	89.72	1356.9	67.596	2.0705	3.3327	.63704	25024.	0.00000	36.915	1.0e-6	Huge	LIQUID
38	97680.	481.00	.2821	89.72	1352.9	67.585	2.0707	3.3324	.63708	25026.	0.00000	36.911	1.0e-6	Huge	LIQUID
39	100320	494.00	.2821	89.72	1349.0	67.574	2.0709	3.3321	.63711	25029.	0.00000	36.908	1.0e-6	Huge	LIQUID
40	102960	507.00	.2821	89.72	1345.0	67.563	2.0710	3.3318	.63715	25031.	0.00000	36.904	1.0e-6	Huge	LIQUID
41	105600	520.00	.2821	89.72	1341.0	67.552	2.0712	3.3315	.63719	25033.	0.00000	36.900	1.0e-6	Huge	LIQUID
42	108240	533.00	.2821	89.72	1337.1	67.541	2.0714	3.3311	.63722	25036.	0.00000	36.897	1.0e-6	Huge	LIQUID
43	110880	546.00	.2821	89.72	1333.1	67.530	2.0716	3.3308	.63726	25038.	0.00000	36.893	1.0e-6	Huge	LIQUID
44	113520	559.00	.2821	89.72	1329.1	67.519	2.0718	3.3305	.63729	25040.	0.00000	36.890	1.0e-6	Huge	LIQUID
45	116160	572.00	.2821	89.72	1325.2	67.507	2.0720	3.3302	.63733	25043.	0.00000	36.886	1.0e-6	Huge	LIQUID
46	118800	585.00	.2821	89.72	1321.2	67.496	2.0722	3.3299	.63736	25045.	0.00000	36.883	1.0e-6	Huge	LIQUID
47	121440	598.00	.2821	89.72	1317.2	67.485	2.0724	3.3296	.63740	25048.	0.00000	36.879	1.0e-6	Huge	LIQUID
48	124080	611.00	.2821	89.72	1313.3	67.474	2.0726	3.3292	.63744	25050.	0.00000	36.876	1.0e-6	Huge	LIQUID
49	126720	624.00	.2821	89.72	1309.3	67.463	2.0728	3.3289	.63747	25052.	0.00000	36.872	1.0e-6	Huge	LIQUID
50	129360	637.00	.2821	89.72	1305.3	67.452	2.0730	3.3286	.63751	25055.	0.00000	36.869	1.0e-6	Huge	LIQUID
51	132000	650.00	.2821	89.72	1301.4	67.441	2.0732	3.3283	.63754	25057.	0.00000	36.865	1.0e-6	Huge	LIQUID
52	134640	663.00	.2821	89.72	1297.4	67.430	2.0734	3.3280	.63758	25059.	0.00000	36.862	1.0e-6	Huge	LIQUID
53	137280	676.00	.2821	89.72	1293.4	67.418	2.0736	3.3277	.63762	25062.	0.00000	36.858	1.0e-6	Huge	LIQUID
54	139920	689.00	.2821	89.72	1289.5	67.407	2.0738	3.3273	.63765	25064.	0.00000	36.855	1.0e-6	Huge	LIQUID
55	142560	702.00	.2821	89.72	1285.5	67.396	2.0740	3.3270	.63769	25067.	0.00000	36.851	1.0e-6	Huge	LIQUID
56	145200	715.00	.2821	89.72	1281.5	67.385	2.0742	3.3267	.63772	25069.	0.00000	36.848	1.0e-6	Huge	LIQUID
57	147840	728.00	.2821	89.72	1277.6	67.374	2.0744	3.3264	.63776	25071.	0.00000	36.844	1.0e-6	Huge	LIQUID
58	150480	741.00	.2821	89.72	1273.6	67.363	2.0746	3.3261	.63779	25074.	0.00000	36.841	1.0e-6	Huge	LIQUID
59	153120	754.00	.2821	89.72	1269.7	67.352	2.0748	3.3258	.63783	25076.	0.00000	36.837	1.0e-6	Huge	LIQUID
60	155760	767.00	.2821	89.72	1265.7	67.341	2.0750	3.3254	.63787	25078.	0.00000	36.834	1.0e-6	Huge	LIQUID
61	158400	780.00	.2821	89.72	1261.7	67.330	2.0752	3.3251	.63790	25081.	0.00000	36.831	1.0e-6	Huge	LIQUID
62	161040	793.00	.2821	89.72	1257.8	67.319	2.0754	3.3248	.63794	25083.	0.00000	36.827	1.0e-6	Huge	LIQUID
63	163680	806.00	.2821	89.72	1253.8	67.308	2.0756	3.3245	.63797	25086.	0.00000	36.824	1.0e-6	Huge	LIQUID
64	166320	819.00	.2821	89.72	1249.8	67.297	2.0758	3.3242	.63801	25088.	0.00000	36.820	1.0e-6	Huge	LIQUID
65	168960	832.00	.2821	89.72	1245.9	67.286	2.0760	3.3239	.63804	25090.	0.00000	36.817	1.0e-6	Huge	LIQUID
66	171600	845.00	.2821	89.72	1241.9	67.275	2.0762	3.3236	.63808	25093.	0.00000	36.813	1.0e-6	Huge	LIQUID
67	174240	858.00	.2821	89.72	1238.0	67.263	2.0764	3.3232	.63812	25095.	0.00000	36.810	1.0e-6	Huge	LIQUID
68	176880	871.00	.2821	89.72	1234.0	67.252	2.0766	3.3229	.63815	25098.	0.00000	36.806	1.0e-6	Huge	LIQUID
69	179520	884.00	.2821	89.72	1230.0	67.241	2.0768	3.3226	.63819	25100.	0.00000	36.803	1.0e-6	Huge	LIQUID
70	182160	897.00	.2821	89.72	1226.1	67.230	2.0770	3.3223	.63822	25102.	0.00000	36.799	1.0e-6	Huge	LIQUID
71	184800	910.00	.2821	89.72	1222.1	67.219	2.0771	3.3220	.63826	25105.	0.00000	36.796	1.0e-6	Huge	LIQUID
72	187440	923.00	.2821	89.72	1218.2	67.208	2.0773	3.3217	.63829	25107.	0.00000	36.792	1.0e-6	Huge	LIQUID
73	190080	936.00	.2821	89.72	1214.2	67.197	2.0775	3.3214	.63833	25109.	0.00000	36.789	1.0e-6	Huge	LIQUID
74	192720	949.00	.2821	89.72	1210.2	67.186	2.0777	3.3210	.63837	25112.	0.00000	36.785	1.0e-6	Huge	LIQUID
75	195360	962.00	.2821	89.72	1206.3	67.166	2.0790	3.3205	.63845	25111.	.005561	36.785	2.9936	11.22	LIQUID
76	198000	975.00	.2821	89.72	1202.3	67.128	2.0823	3.3163	.63918	25104.	.021814	36.789	2.9937	2.66	LIQUID
77	200640	988.00	.2821	89.72	1198.4	67.090	2.0855	3.3111	.64010	25097.	.038083	36.794	2.9938	1.52	LIQUID
78	203280	1001.0	.2821	89.72	1194.4	67.053	2.0888	3.3059	.64102	25089.	.054368	36.799	2.9939	1.06	LIQUID
79	205920	1014.0	.2821	89.72	1190.5	67.015	2.0921	3.3007	.64193	25082.	.070676	36.804	2.9941	0.82	LIQUID
80	208560	1027.0	.2821	89.72	1186.5	66.978	2.0954	3.2955	.64285	25075.	.086993	36.809	2.9942	0.66	LIQUID

81	211200	1040.0	.2821	89.72	1182.6	66.940	2.0987	3.2904	.65920	25068.	.103395	36.814	2.9943	0.56	B/B INTERMITTENT
82	213840	1053.0	.2821	89.72	1178.6	66.903	2.1020	3.2852	.66282	25061.	.119826	36.819	2.9944	0.48	B/B INTERMITTENT
83	216480	1066.0	.2821	89.72	1174.7	66.866	2.1053	3.2800	.66645	25054.	.136287	36.824	2.9945	0.42	B/B INTERMITTENT
84	219120	1079.0	.2821	89.72	1170.7	66.828	2.1086	3.2749	.67009	25047.	.152758	36.829	2.9946	0.38	B/B INTERMITTENT
85	221760	1092.0	.2821	89.72	1166.8	66.791	2.1119	3.2697	.67375	25039.	.169285	36.834	2.9947	0.34	B/B INTERMITTENT
86	224400	1105.0	.2821	89.72	1162.9	66.754	2.1152	3.2646	.67743	25032.	.185822	36.838	2.9948	0.31	B/B INTERMITTENT
87	227040	1118.0	.2821	89.72	1158.9	66.718	2.1186	3.2594	.68112	25025.	.202402	36.843	2.9949	0.28	B/B INTERMITTENT
88	229680	1131.0	.2821	89.72	1155.0	66.681	2.1219	3.2543	.68482	25018.	.219012	36.848	2.9951	0.26	B/B INTERMITTENT
89	232320	1144.0	.2821	89.72	1151.0	66.644	2.1252	3.2492	.68855	25011.	.235652	36.853	2.9952	0.24	B/B INTERMITTENT
90	234960	1157.0	.2821	89.72	1147.1	66.607	2.1286	3.2441	.69228	25003.	.252314	36.858	2.9953	0.23	B/B INTERMITTENT
91	237600	1170.0	.2821	89.72	1143.2	66.571	2.1320	3.2390	.69603	24996.	.269007	36.863	2.9954	0.21	B/B INTERMITTENT
92	240240	1183.0	.2821	89.72	1139.2	66.534	2.1353	3.2339	.69980	24989.	.285736	36.868	2.9955	0.20	B/B INTERMITTENT
93	242880	1196.0	.2821	89.72	1135.3	66.498	2.1387	3.2288	.70358	24982.	.302481	36.873	2.9956	0.19	B/B INTERMITTENT
94	245520	1209.0	.2821	89.72	1131.4	66.461	2.1421	3.2237	.70738	24975.	.319270	36.878	2.9957	0.18	B/B INTERMITTENT
95	248160	1222.0	.2821	89.72	1127.4	66.425	2.1454	3.2186	.71120	24967.	.336095	36.882	2.9958	0.17	B/B INTERMITTENT
96	250800	1235.0	.2821	89.72	1123.5	66.389	2.1488	3.2136	.71503	24960.	.352943	36.887	2.9959	0.16	B/B INTERMITTENT
97	253440	1248.0	.2821	89.72	1119.6	66.352	2.1522	3.2085	.71887	24953.	.369815	36.892	2.9960	0.15	B/B INTERMITTENT
98	256080	1261.0	.2821	89.72	1115.7	66.316	2.1556	3.2034	.72273	24946.	.386723	36.897	2.9961	0.15	B/B INTERMITTENT
99	258720	1274.0	.2821	89.72	1111.7	66.280	2.1590	3.1984	.72661	24938.	.403667	36.902	2.9963	0.14	B/B INTERMITTENT
100	261360	1287.0	.2821	89.72	1107.8	66.244	2.1624	3.1933	.73051	24931.	.420648	36.907	2.9964	0.13	B/B INTERMITTENT
101	264000	1300.0	.2821	89.72	1103.9	66.209	2.1658	3.1883	.73442	24924.	.437659	36.912	2.9965	0.13	B/B INTERMITTENT

Total pressure drop of single phase black oil flow due to + 1300ft feet elevation is 348.644 psi

Single phase gas at +1300 feet of elevation

	Dist.	Elev.	Horiz. Angle	Vert. Devn.	Pres.	Temp.	Mean Vel.	Pressure Drop (psi)		Liquid Flow	Free Gas	Densities (lb/ft3)		Slug Number	Flow Pattern
	(feet)	(feet)	(deg)	(deg)	(psia)	(F)	(ft/s)	Elev.	Frictn.	(bbl/d)	(mmscfd)	Liquid	Gas	(PI-SS)	
FLOWLINE Flowline_1															
1	0.0000	0.0000	.2821	89.72	2500.0	68.000	2.9887	0.0000	0.0000	0.0000	26.0000	.00010	11.778		GAS
2	2640.0	13.000	.2821	89.72	2498.3	67.931	2.9898	1.0631	.62672	0.0000	26.0000	.00010	11.773	Huge	GAS
3	5280.0	26.000	.2821	89.72	2496.6	67.862	2.9909	1.0627	.62695	0.0000	26.0000	.00010	11.769	Huge	GAS
4	7920.0	39.000	.2821	89.72	2494.9	67.792	2.9920	1.0623	.62717	0.0000	26.0000	.00010	11.765	Huge	GAS
5	10560.	52.000	.2821	89.72	2493.2	67.723	2.9931	1.0619	.62740	0.0000	26.0000	.00010	11.760	Huge	GAS
6	13200.	65.000	.2821	89.72	2491.6	67.654	2.9942	1.0615	.62763	0.0000	26.0000	.00010	11.756	Huge	GAS
7	15840.	78.000	.2821	89.72	2489.9	67.585	2.9953	1.0611	.62786	0.0000	26.0000	.00010	11.751	Huge	GAS
8	18480.	91.000	.2821	89.72	2488.2	67.516	2.9964	1.0607	.62809	0.0000	26.0000	.00010	11.747	Huge	GAS
9	21120.	104.00	.2821	89.72	2486.5	67.446	2.9976	1.0603	.62831	0.0000	26.0000	.00010	11.743	Huge	GAS
10	23760.	117.00	.2821	89.72	2484.8	67.377	2.9987	1.0599	.62854	0.0000	26.0000	.00010	11.738	Huge	GAS
11	26400.	130.00	.2821	89.72	2483.1	67.308	2.9998	1.0595	.62877	0.0000	26.0000	.00010	11.734	Huge	GAS
12	29040.	143.00	.2821	89.72	2481.4	67.239	3.0009	1.0591	.62900	0.0000	26.0000	.00010	11.730	Huge	GAS
13	31680.	156.00	.2821	89.72	2479.7	67.170	3.0020	1.0587	.62923	0.0000	26.0000	.00010	11.725	Huge	GAS
14	34320.	169.00	.2821	89.72	2478.0	67.100	3.0031	1.0583	.62946	0.0000	26.0000	.00010	11.721	Huge	GAS
15	36960.	182.00	.2821	89.72	2476.4	67.031	3.0043	1.0579	.62969	0.0000	26.0000	.00010	11.716	Huge	GAS
16	39600.	195.00	.2821	89.72	2474.7	66.962	3.0054	1.0575	.62992	0.0000	26.0000	.00010	11.712	Huge	GAS
17	42240.	208.00	.2821	89.72	2473.0	66.893	3.0065	1.0571	.63015	0.0000	26.0000	.00010	11.708	Huge	GAS
18	44880.	221.00	.2821	89.72	2471.3	66.824	3.0076	1.0567	.63038	0.0000	26.0000	.00010	11.703	Huge	GAS
19	47520.	234.00	.2821	89.72	2469.6	66.755	3.0088	1.0564	.63061	0.0000	26.0000	.00010	11.699	Huge	GAS
20	50160.	247.00	.2821	89.72	2467.9	66.686	3.0099	1.0560	.63084	0.0000	26.0000	.00010	11.695	Huge	GAS
21	52800.	260.00	.2821	89.72	2466.2	66.617	3.0110	1.0556	.63107	0.0000	26.0000	.00010	11.690	Huge	GAS
22	55440.	273.00	.2821	89.72	2464.5	66.548	3.0122	1.0552	.63131	0.0000	26.0000	.00010	11.686	Huge	GAS
23	58080.	286.00	.2821	89.72	2462.9	66.478	3.0133	1.0548	.63154	0.0000	26.0000	.00010	11.681	Huge	GAS
24	60720.	299.00	.2821	89.72	2461.2	66.409	3.0144	1.0544	.63177	0.0000	26.0000	.00010	11.677	Huge	GAS
25	63360.	312.00	.2821	89.72	2459.5	66.340	3.0156	1.0540	.63200	0.0000	26.0000	.00010	11.673	Huge	GAS
26	66000.	325.00	.2821	89.72	2457.8	66.271	3.0167	1.0536	.63224	0.0000	26.0000	.00010	11.668	Huge	GAS
27	68640.	338.00	.2821	89.72	2456.1	66.202	3.0179	1.0532	.63247	0.0000	26.0000	.00010	11.664	Huge	GAS
28	71280.	351.00	.2821	89.72	2454.4	66.133	3.0190	1.0528	.63270	0.0000	26.0000	.00010	11.659	Huge	GAS
29	73920.	364.00	.2821	89.72	2452.7	66.064	3.0201	1.0524	.63294	0.0000	26.0000	.00010	11.655	Huge	GAS
30	76560.	377.00	.2821	89.72	2451.1	65.995	3.0213	1.0520	.63317	0.0000	26.0000	.00010	11.651	Huge	GAS
31	79200.	390.00	.2821	89.72	2449.4	65.926	3.0224	1.0516	.63341	0.0000	26.0000	.00010	11.646	Huge	GAS
32	81840.	403.00	.2821	89.72	2447.7	65.857	3.0236	1.0512	.63364	0.0000	26.0000	.00010	11.642	Huge	GAS
33	84480.	416.00	.2821	89.72	2446.0	65.788	3.0247	1.0508	.63388	0.0000	26.0000	.00010	11.637	Huge	GAS
34	87120.	429.00	.2821	89.72	2444.3	65.719	3.0259	1.0504	.63411	0.0000	26.0000	.00010	11.633	Huge	GAS
35	89760.	442.00	.2821	89.72	2442.6	65.650	3.0270	1.0500	.63435	0.0000	26.0000	.00010	11.628	Huge	GAS
36	92400.	455.00	.2821	89.72	2440.9	65.581	3.0282	1.0496	.63458	0.0000	26.0000	.00010	11.624	Huge	GAS
37	95040.	468.00	.2821	89.72	2439.3	65.512	3.0293	1.0492	.63482	0.0000	26.0000	.00010	11.620	Huge	GAS
38	97680.	481.00	.2821	89.72	2437.6	65.443	3.0305	1.0488	.63505	0.0000	26.0000	.00010	11.615	Huge	GAS
39	100320	494.00	.2821	89.72	2435.9	65.374	3.0316	1.0484	.63529	0.0000	26.0000	.00010	11.611	Huge	GAS
40	102960	507.00	.2821	89.72	2434.2	65.305	3.0328	1.0480	.63553	0.0000	26.0000	.00010	11.606	Huge	GAS
41	105600	520.00	.2821	89.72	2432.5	65.236	3.0340	1.0476	.63576	0.0000	26.0000	.00010	11.602	Huge	GAS
42	108240	533.00	.2821	89.72	2430.8	65.167	3.0351	1.0472	.63600	0.0000	26.0000	.00010	11.597	Huge	GAS
43	110880	546.00	.2821	89.72	2429.2	65.098	3.0363	1.0468	.63624	0.0000	26.0000	.00010	11.593	Huge	GAS
44	113520	559.00	.2821	89.72	2427.5	65.029	3.0374	1.0464	.63648	0.0000	26.0000	.00010	11.589	Huge	GAS
45	116160	572.00	.2821	89.72	2425.8	64.960	3.0386	1.0460	.63672	0.0000	26.0000	.00010	11.584	Huge	GAS
46	118800	585.00	.2821	89.72	2424.1	64.891	3.0398	1.0456	.63696	0.0000	26.0000	.00010	11.580	Huge	GAS
47	121440	598.00	.2821	89.72	2422.4	64.822	3.0409	1.0452	.63719	0.0000	26.0000	.00010	11.575	Huge	GAS
48	124080	611.00	.2821	89.72	2420.7	64.753	3.0421	1.0448	.63743	0.0000	26.0000	.00010	11.571	Huge	GAS
49	126720	624.00	.2821	89.72	2419.1	64.684	3.0433	1.0444	.63767	0.0000	26.0000	.00010	11.566	Huge	GAS
50	129360	637.00	.2821	89.72	2417.4	64.615	3.0445	1.0440	.63791	0.0000	26.0000	.00010	11.562	Huge	GAS
51	132000	650.00	.2821	89.72	2415.7	64.547	3.0456	1.0436	.63815	0.0000	26.0000	.00010	11.557	Huge	GAS
52	134640	663.00	.2821	89.72	2414.0	64.478	3.0468	1.0432	.63839	0.0000	26.0000	.00010	11.553	Huge	GAS
53	137280	676.00	.2821	89.72	2412.3	64.409	3.0480	1.0428	.63863	0.0000	26.0000	.00010	11.548	Huge	GAS
54	139920	689.00	.2821	89.72	2410.7	64.340	3.0492	1.0424	.63888	0.0000	26.0000	.00010	11.544	Huge	GAS
55	142560	702.00	.2821	89.72	2409.0	64.271	3.0503	1.0420	.63912	0.0000	26.0000	.00010	11.540	Huge	GAS
56	145200	715.00	.2821	89.72	2407.3	64.202	3.0515	1.0416	.63936	0.0000	26.0000	.00010	11.535	Huge	GAS
57	147840	728.00	.2821	89.72	2405.6	64.133	3.0527	1.0412	.63960	0.0000	26.0000	.00010	11.531	Huge	GAS
58	150480	741.00	.2821	89.72	2403.9	64.064	3.0539	1.0408	.63984	0.0000	26.0000	.00010	11.526	Huge	GAS
59	153120	754.00	.2821	89.72	2402.3	63.995	3.0551	1.0404	.64008	0.0000	26.0000	.00010	11.522	Huge	GAS
60	155760	767.00	.2821	89.72	2400.6	63.926	3.0563	1.0399	.64033	0.0000	26.0000	.00010	11.517	Huge	GAS
61	158400	780.00	.2821	89.72	2398.9	63.857	3.0574	1.0395	.64057	0.0000	26.0000	.00010	11.513	Huge	GAS
62	161040	793.00	.2821	89.72	2397.2	63.789	3.0586	1.0391	.64081	0.0000	26.0000	.00010	11.508	Huge	GAS
63	163680	806.00	.2821	89.72	2395.5	63.720	3.0598	1.0387	.64106	0.0000	26.0000	.00010	11.504	Huge	GAS
64	166320	819.00	.2821	89.72	2393.9	63.651	3.0610	1.0383	.64130	0.0000	26.0000	.00010	11.499	Huge	GAS
65	168960	832.00	.2821	89.72	2392.2	63.582	3.0622	1.0379	.64155	0.0000	26.0000	.00010	11.495	Huge	GAS
66	171600	845.00	.2821	89.72	2390.5	63.513	3.0634	1.0375	.64179	0.0000	26.0000	.00010	11.490	Huge	GAS
67	174240	858.00	.2821	89.72	2388.8	63.444	3.0646	1.0371	.64203	0.0000	26.0000	.00010	11.486	Huge	GAS
68	176880	871.00	.2821	89.72	2387.1	63.376	3.0658	1.0367	.64228	0.0000	26.0000	.00010	11.481	Huge	GAS
69	179520	884.00	.2821	89.72	2385.5	63.307	3.0670	1.0363	.64253	0.0000	26.0000	.00010	11.477	Huge	GAS
70	182160	897.00	.2821	89.72	2383.8	63.238	3.0682	1.0359	.64277	0.0000	26.0000	.00010	11.472	Huge	GAS
71	184800	910.00	.2821	89.72	2382.1	63.169	3.0694	1.0355	.64302	0.0000	26.0000	.00010	11.468	Huge	GAS
72	187440	923.00	.2821	89.72	2380.4	63.101	3.0706	1.0351	.64326	0.0000	26.0000	.00010	11.463	Huge	GAS
73	190080	936.00	.2821	89.72	2378.7	63.032	3.0718	1.0347	.64351	0.0000	26.0000	.00010	11.459	Huge	GAS
74	192720	949.00	.2821	89.72	2377.1	62.963	3.0730	1.0343	.64376	0.0000	26.0000	.00010	11.454	Huge	GAS
75	195360	962.00	.2821	89.72	2375.4	62.894	3.0742	1.0339	.64400	0.0000	26.0000	.00010	11.450	Huge	GAS
76	198000	975.00	.2821	89.72	2373.7	62.826	3.0755	1.0335	.64425	0.0000	26.0000	.00010	11.445	Huge	GAS
77	200640	988.00	.2821	89.72	2372.0	62.757	3.0767	1.0331	.64450	0.0000	26.0000	.00010	11.441	Huge	GAS
78	203280	1001.0	.2821	89.72	2370.4	62.688	3.0779	1.0326	.64475	0.0000	26.0000	.00010	11.436	Huge	GAS
79	205920	1014.0	.2821	89.72	2368.7	62.619	3.0791	1.0322	.64500	0.0000	26.0000	.00010	11.432	Huge	GAS
80	208560	1027.0	.2821	89.72	2367.0	62.551	3.0803	1.0318	.64525	0.0000	26.0000	.00010	11.427	Huge	GAS

81	211200	1040.0	.2821	89.72	2365.3	62.482	3.0815	1.0314	.64550	0.0000	26.0000	.00010	11.423	Huge GAS
82	213840	1053.0	.2821	89.72	2363.6	62.413	3.0828	1.0310	.64574	0.0000	26.0000	.00010	11.418	Huge GAS
83	216480	1066.0	.2821	89.72	2362.0	62.345	3.0840	1.0306	.64599	0.0000	26.0000	.00010	11.414	Huge GAS
84	219120	1079.0	.2821	89.72	2360.3	62.276	3.0852	1.0302	.64624	0.0000	26.0000	.00010	11.409	Huge GAS
85	221760	1092.0	.2821	89.72	2358.6	62.208	3.0864	1.0298	.64650	0.0000	26.0000	.00010	11.405	Huge GAS
86	224400	1105.0	.2821	89.72	2356.9	62.139	3.0876	1.0294	.64675	0.0000	26.0000	.00010	11.400	Huge GAS
87	227040	1118.0	.2821	89.72	2355.3	62.070	3.0889	1.0290	.64700	0.0000	26.0000	.00010	11.396	Huge GAS
88	229680	1131.0	.2821	89.72	2353.6	62.002	3.0901	1.0286	.64725	0.0000	26.0000	.00010	11.391	Huge GAS
89	232320	1144.0	.2821	89.72	2351.9	61.933	3.0913	1.0282	.64750	0.0000	26.0000	.00010	11.387	Huge GAS
90	234960	1157.0	.2821	89.72	2350.2	61.864	3.0926	1.0277	.64775	0.0000	26.0000	.00010	11.382	Huge GAS
91	237600	1170.0	.2821	89.72	2348.6	61.796	3.0938	1.0273	.64800	0.0000	26.0000	.00010	11.377	Huge GAS
92	240240	1183.0	.2821	89.72	2346.9	61.727	3.0950	1.0269	.64826	0.0000	26.0000	.00010	11.373	Huge GAS
93	242880	1196.0	.2821	89.72	2345.2	61.659	3.0963	1.0265	.64851	0.0000	26.0000	.00010	11.368	Huge GAS
94	245520	1209.0	.2821	89.72	2343.5	61.590	3.0975	1.0261	.64876	0.0000	26.0000	.00010	11.364	Huge GAS
95	248160	1222.0	.2821	89.72	2341.9	61.521	3.0988	1.0257	.64902	0.0000	26.0000	.00010	11.359	Huge GAS
96	250800	1235.0	.2821	89.72	2340.2	61.453	3.1000	1.0253	.64927	0.0000	26.0000	.00010	11.355	Huge GAS
97	253440	1248.0	.2821	89.72	2338.5	61.384	3.1012	1.0249	.64952	0.0000	26.0000	.00010	11.350	Huge GAS
98	256080	1261.0	.2821	89.72	2336.8	61.315	3.1025	1.0245	.64978	0.0000	26.0000	.00010	11.346	Huge GAS
99	258720	1274.0	.2821	89.72	2335.2	61.247	3.1037	1.0240	.65003	0.0000	26.0000	.00010	11.341	Huge GAS
100	261360	1287.0	.2821	89.72	2333.5	61.178	3.1050	1.0236	.65029	0.0000	26.0000	.00010	11.336	Huge GAS
101	264000	1300.0	.2821	89.72	2331.8	61.110	3.1062	1.0232	.65054	0.0000	26.0000	.00010	11.332	Huge GAS

Total pressure drop of single phase gas flow due to + 1300ft feet elevation is 104.33 psi

Multiphase flow at +1300 feet of elevation

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_2														
1	0.0000	0.0000	.2821	89.72	3600.0	68.000	.98282	0.0000	0.0000	10834.	2.00257	56.687	19.541		B/B TRANSITION
2	2640.0	13.000	.2821	89.72	3594.6	67.993	.98290	4.7973	.63379	10832.	2.00616	56.693	19.530	3.83	B/B TRANSITION
3	5280.0	26.000	.2821	89.72	3589.1	67.986	.98299	4.7969	.63452	10831.	2.00975	56.698	19.519	1.91	B/B TRANSITION
4	7920.0	39.000	.2821	89.72	3583.7	67.978	.98307	4.7964	.63525	10829.	2.01335	56.703	19.508	1.28	B/B TRANSITION
5	10560.	52.000	.2821	89.72	3578.3	67.972	.98315	4.7960	.63598	10827.	2.01694	56.708	19.497	0.96	B/B TRANSITION
6	13200.	65.000	.2821	89.72	3572.8	67.965	.98324	4.7956	.63671	10826.	2.02053	56.713	19.486	0.77	B/B TRANSITION
7	15840.	78.000	.2821	89.72	3567.4	67.958	.98332	4.7952	.63745	10824.	2.02413	56.718	19.475	0.64	B/B TRANSITION
8	18480.	91.000	.2821	89.72	3562.0	67.951	.98341	4.7948	.63818	10822.	2.02771	56.723	19.464	0.55	B/B TRANSITION
9	21120.	104.00	.2821	89.72	3556.5	67.945	.98350	4.7944	.63892	10821.	2.03131	56.728	19.453	0.48	B/B TRANSITION
10	23760.	117.00	.2821	89.72	3551.1	67.937	.98358	4.7939	.63966	10819.	2.03489	56.733	19.442	0.42	B/B TRANSITION
11	26400.	130.00	.2821	89.72	3545.7	67.931	.98367	4.7935	.64041	10817.	2.03849	56.738	19.430	0.38	B/B TRANSITION
12	29040.	143.00	.2821	89.72	3540.2	67.925	.98376	4.7931	.64115	10816.	2.04208	56.743	19.419	0.35	B/B TRANSITION
13	31680.	156.00	.2821	89.72	3534.8	67.919	.98385	4.7927	.64190	10814.	2.04566	56.748	19.408	0.32	B/B TRANSITION
14	34320.	169.00	.2821	89.72	3529.4	67.913	.98393	4.7922	.64265	10812.	2.04926	56.753	19.397	0.29	B/B TRANSITION
15	36960.	182.00	.2821	89.72	3523.9	67.907	.98402	4.7918	.64340	10811.	2.05284	56.758	19.385	0.27	B/B TRANSITION
16	39600.	195.00	.2821	89.72	3518.5	67.901	.98411	4.7914	.64415	10809.	2.05643	56.763	19.374	0.25	B/B TRANSITION
17	42240.	208.00	.2821	89.72	3513.1	67.895	.98420	4.7913	.64464	10807.	2.06002	56.768	19.363	0.24	B/B TRANSITION
18	44880.	221.00	.2821	89.72	3507.6	67.889	.98429	4.7914	.64491	10806.	2.06361	56.774	19.351	0.22	B/B TRANSITION
19	47520.	234.00	.2821	89.72	3502.2	67.883	.98438	4.7916	.64517	10804.	2.06720	56.779	19.340	0.21	B/B TRANSITION
20	50160.	247.00	.2821	89.72	3496.8	67.878	.98448	4.7917	.64544	10802.	2.07078	56.784	19.329	0.20	B/B TRANSITION
21	52800.	260.00	.2821	89.72	3491.3	67.872	.98457	4.7919	.64570	10801.	2.07437	56.789	19.317	0.19	B/B TRANSITION
22	55440.	273.00	.2821	89.72	3485.9	67.867	.98466	4.7920	.64597	10799.	2.07796	56.794	19.306	0.18	B/B TRANSITION
23	58080.	286.00	.2821	89.72	3480.4	67.861	.98475	4.7921	.64624	10797.	2.08154	56.799	19.294	0.17	B/B TRANSITION
24	60720.	299.00	.2821	89.72	3475.0	67.856	.98485	4.7923	.64650	10796.	2.08513	56.804	19.283	0.17	B/B TRANSITION
25	63360.	312.00	.2821	89.72	3469.6	67.851	.98494	4.7924	.64677	10794.	2.08871	56.809	19.271	0.16	B/B TRANSITION
26	66000.	325.00	.2821	89.72	3464.1	67.846	.98503	4.7926	.64704	10792.	2.09230	56.814	19.260	0.15	B/B TRANSITION
27	68640.	338.00	.2821	89.72	3458.7	67.840	.98513	4.7927	.64731	10791.	2.09588	56.819	19.248	0.15	B/B TRANSITION
28	71280.	351.00	.2821	89.72	3453.2	67.835	.98522	4.7929	.64758	10789.	2.09946	56.824	19.237	0.14	B/B TRANSITION
29	73920.	364.00	.2821	89.72	3447.8	67.830	.98532	4.7930	.64785	10787.	2.10304	56.829	19.225	0.14	B/B TRANSITION
30	76560.	377.00	.2821	89.72	3442.4	67.825	.98541	4.7932	.64812	10786.	2.10663	56.834	19.213	0.13	B/B TRANSITION
31	79200.	390.00	.2821	89.72	3436.9	67.821	.98551	4.7933	.64839	10784.	2.11021	56.839	19.202	0.13	B/B TRANSITION
32	81840.	403.00	.2821	89.72	3431.5	67.816	.98561	4.7934	.64866	10783.	2.11379	56.844	19.190	0.12	B/B TRANSITION
33	84480.	416.00	.2821	89.72	3426.0	67.811	.98570	4.7936	.64893	10781.	2.11738	56.849	19.178	0.12	B/B TRANSITION
34	87120.	429.00	.2821	89.72	3420.6	67.806	.98580	4.7937	.64920	10779.	2.12095	56.854	19.166	0.12	B/B TRANSITION
35	89760.	442.00	.2821	89.72	3415.2	67.802	.98590	4.7939	.64947	10778.	2.12454	56.859	19.155	0.11	B/B TRANSITION
36	92400.	455.00	.2821	89.72	3409.7	67.797	.98600	4.7940	.64975	10776.	2.12812	56.864	19.143	0.11	B/B TRANSITION
37	95040.	468.00	.2821	89.72	3404.3	67.793	.98610	4.7941	.65002	10774.	2.13170	56.869	19.131	0.11	B/B TRANSITION
38	97680.	481.00	.2821	89.72	3398.8	67.788	.98620	4.7943	.65029	10773.	2.13527	56.874	19.119	0.10	B/B TRANSITION
39	100320	494.00	.2821	89.72	3393.4	67.784	.98630	4.7944	.65057	10771.	2.13885	56.879	19.107	0.10	B/B TRANSITION
40	102960	507.00	.2821	89.72	3387.9	67.780	.98640	4.7945	.65084	10769.	2.14243	56.884	19.095	0.10	B/B TRANSITION
41	105600	520.00	.2821	89.72	3382.5	67.776	.98650	4.7947	.65112	10768.	2.14601	56.889	19.083	0.10	B/B TRANSITION
42	108240	533.00	.2821	89.72	3377.0	67.771	.98660	4.7948	.65139	10766.	2.14958	56.894	19.071	0.09	B/B TRANSITION
43	110880	546.00	.2821	89.72	3371.6	67.768	.98670	4.7949	.65167	10764.	2.15316	56.898	19.059	0.09	B/B TRANSITION
44	113520	559.00	.2821	89.72	3366.1	67.764	.98681	4.7950	.65194	10763.	2.15673	56.903	19.047	0.09	B/B TRANSITION
45	116160	572.00	.2821	89.72	3360.7	67.759	.98691	4.7952	.65222	10761.	2.16031	56.908	19.035	0.09	B/B TRANSITION
46	118800	585.00	.2821	89.72	3355.3	67.755	.98701	4.7953	.65250	10760.	2.16388	56.913	19.023	0.09	B/B TRANSITION
47	121440	598.00	.2821	89.72	3349.8	67.752	.98712	4.7954	.65278	10758.	2.16746	56.918	19.011	0.08	B/B TRANSITION
48	124080	611.00	.2821	89.72	3344.4	67.748	.98722	4.7956	.65305	10756.	2.17103	56.923	18.999	0.08	B/B TRANSITION
49	126720	624.00	.2821	89.72	3338.9	67.744	.98733	4.7957	.65333	10755.	2.17460	56.928	18.987	0.08	B/B TRANSITION
50	129360	637.00	.2821	89.72	3333.5	67.740	.98743	4.7958	.65361	10753.	2.17817	56.933	18.975	0.08	B/B TRANSITION
51	132000	650.00	.2821	89.72	3328.0	67.736	.98754	4.7959	.65389	10751.	2.18174	56.938	18.962	0.08	B/B TRANSITION
52	134640	663.00	.2821	89.72	3322.6	67.732	.98765	4.7961	.65417	10750.	2.18531	56.943	18.950	0.08	B/B TRANSITION
53	137280	676.00	.2821	89.72	3317.1	67.729	.98775	4.7962	.65445	10748.	2.18888	56.948	18.938	0.07	B/B TRANSITION
54	139920	689.00	.2821	89.72	3311.7	67.725	.98786	4.7963	.65473	10746.	2.19245	56.953	18.926	0.07	B/B TRANSITION
55	142560	702.00	.2821	89.72	3306.2	67.721	.98797	4.7964	.65501	10745.	2.19602	56.958	18.913	0.07	B/B TRANSITION
56	145200	715.00	.2821	89.72	3300.8	67.718	.98808	4.7965	.65529	10743.	2.19958	56.963	18.901	0.07	B/B TRANSITION
57	147840	728.00	.2821	89.72	3295.3	67.714	.98819	4.7967	.65558	10742.	2.20315	56.968	18.889	0.07	B/B TRANSITION
58	150480	741.00	.2821	89.72	3289.9	67.711	.98830	4.7968	.65586	10740.	2.20672	56.973	18.876	0.07	B/B TRANSITION
59	153120	754.00	.2821	89.72	3284.4	67.707	.98841	4.7969	.65614	10738.	2.21028	56.977	18.864	0.07	B/B TRANSITION
60	155760	767.00	.2821	89.72	3278.9	67.704	.98852	4.7970	.65642	10737.	2.21384	56.982	18.851	0.07	B/B TRANSITION
61	158400	780.00	.2821	89.72	3273.5	67.701	.98863	4.7971	.65671	10735.	2.21741	56.987	18.839	0.06	B/B TRANSITION
62	161040	793.00	.2821	89.72	3268.0	67.697	.98874	4.7972	.65699	10733.	2.22097	56.992	18.827	0.06	B/B TRANSITION
63	163680	806.00	.2821	89.72	3262.6	67.694	.98885	4.7974	.65728	10732.	2.22453	56.997	18.814	0.06	B/B TRANSITION
64	166320	819.00	.2821	89.72	3257.1	67.691	.98896	4.7975	.65756	10730.	2.22809	57.002	18.801	0.06	B/B TRANSITION
65	168960	832.00	.2821	89.72	3251.7	67.687	.98908	4.7976	.65785	10729.	2.23166	57.007	18.789	0.06	B/B TRANSITION
66	171600	845.00	.2821	89.72	3246.2	67.684	.98919	4.7977	.65813	10727.	2.23521	57.012	18.776	0.06	B/B TRANSITION
67	174240	858.00	.2821	89.72	3240.8	67.681	.98931	4.7978	.65842	10725.	2.23877	57.017	18.764	0.06	B/B TRANSITION
68	176880	871.00	.2821	89.72	3235.3	67.678	.98942	4.7979	.65871	10724.	2.24233	57.022	18.751	0.06	B/B TRANSITION
69	179520	884.00	.2821	89.72	3229.8	67.675	.98954	4.7980	.65899	10722.	2.24589	57.026	18.738	0.06	B/B TRANSITION
70	182160	897.00	.2821	89.72	3224.4	67.672	.98965	4.7981	.65928	10721.	2.24945	57.031	18.726	0.06	B/B TRANSITION
71	184800	910.00	.2821	89.72	3218.9	67.669	.98977	4.7982	.65957	10719.	2.25300	57.036	18.713	0.06	B/B TRANSITION
72	187440	923.00	.2821	89.72	3213.5	67.666	.98988	4.7983	.65986	10717.	2.25656	57.041	18.700	0.05	B/B TRANSITION
73	190080	936.00	.2821	89.72	3208.0	67.663	.99000	4.7984	.66015	10716.	2.26011	57.046	18.687	0.05	B/B TRANSITION
74	192720	949.00	.2821	89.72	3202.6	67.660	.99012	4.7985	.66044	10714.	2.26366	57.051	18.675	0.05	B/B TRANSITION
75	195360	962.00	.2821	89.72	3197.1	67.657	.99024	4.7986	.66073	10712.	2.26722	57.056	18.662	0.05	B/B TRANSITION
76	198000	975.00	.2821	89.72	3191.6	67.654	.99036	4.7987	.66102	10711.	2.27077	57.061	18.649	0.05	B/B TRANSITION
77	200640	988.00	.2821	89.72	3186.2	67.651	.99048	4.7989	.66131	10709.	2.27432	57.065	18.636	0.05	B/B TRANSITION
78	203280	1001.0	.2821	89.72	3180.7	67.648	.99060	4.7990	.66160	10708.	2.27787	57.070	18.623	0.05	B/B TRANSITION
79	205920	1014.0	.2821	89.72	3175.3	67.646	.99072	4.7991	.66189	10706.	2.28142	57.075	18.610	0.05	B/B TRANSITION
80	208560	1027.0	.2821	89.72	3169.8	67.643	.99084	4.7991	.66218	10704.	2.28496	57.080	18.597	0.05	B/B TRANSITION

81	211200	1040.0	.2821	89.72	3164.3	67.640	.99096	4.7992	.66247	10703.	2.28852	57.085	18.584	0.05 B/B TRANSITION
82	213840	1053.0	.2821	89.72	3158.9	67.637	.99109	4.7993	.66277	10701.	2.29206	57.090	18.571	0.05 B/B TRANSITION
83	216480	1066.0	.2821	89.72	3153.4	67.635	.99121	4.7994	.66306	10700.	2.29561	57.094	18.558	0.05 B/B TRANSITION
84	219120	1079.0	.2821	89.72	3147.9	67.632	.99133	4.7995	.66335	10698.	2.29915	57.099	18.545	0.05 B/B TRANSITION
85	221760	1092.0	.2821	89.72	3142.5	67.630	.99146	4.7996	.66365	10696.	2.30270	57.104	18.532	0.05 B/B TRANSITION
86	224400	1105.0	.2821	89.72	3137.0	67.627	.99158	4.7997	.66394	10695.	2.30624	57.109	18.519	0.05 B/B TRANSITION
87	227040	1118.0	.2821	89.72	3131.6	67.624	.99171	4.7998	.66424	10693.	2.30979	57.114	18.506	0.05 B/B TRANSITION
88	229680	1131.0	.2821	89.72	3126.1	67.622	.99183	4.7999	.66453	10692.	2.31333	57.119	18.492	0.05 B/B TRANSITION
89	232320	1144.0	.2821	89.72	3120.6	67.619	.99196	4.8000	.66483	10690.	2.31687	57.123	18.479	0.04 B/B TRANSITION
90	234960	1157.0	.2821	89.72	3115.2	67.617	.99209	4.8001	.66512	10688.	2.32041	57.128	18.466	0.04 B/B TRANSITION
91	237600	1170.0	.2821	89.72	3109.7	67.614	.99221	4.8002	.66542	10687.	2.32394	57.133	18.453	0.04 B/B TRANSITION
92	240240	1183.0	.2821	89.72	3104.2	67.612	.99234	4.8003	.66572	10685.	2.32748	57.138	18.439	0.04 B/B TRANSITION
93	242880	1196.0	.2821	89.72	3098.8	67.609	.99247	4.8003	.66601	10684.	2.33102	57.143	18.426	0.04 B/B TRANSITION
94	245520	1209.0	.2821	89.72	3093.3	67.607	.99260	4.8004	.66631	10682.	2.33456	57.148	18.413	0.04 B/B TRANSITION
95	248160	1222.0	.2821	89.72	3087.8	67.605	.99273	4.8005	.66661	10681.	2.33810	57.152	18.399	0.04 B/B TRANSITION
96	250800	1235.0	.2821	89.72	3082.4	67.602	.99286	4.8006	.66691	10679.	2.34163	57.157	18.386	0.04 B/B TRANSITION
97	253440	1248.0	.2821	89.72	3076.9	67.600	.99299	4.8007	.66721	10677.	2.34516	57.162	18.372	0.04 B/B TRANSITION
98	256080	1261.0	.2821	89.72	3071.4	67.597	.99313	4.8008	.66751	10676.	2.34870	57.167	18.359	0.04 B/B TRANSITION
99	258720	1274.0	.2821	89.72	3066.0	67.595	.99326	4.8008	.66781	10674.	2.35223	57.172	18.345	0.04 B/B TRANSITION
100	261360	1287.0	.2821	89.72	3060.5	67.593	.99339	4.8009	.66811	10673.	2.35576	57.176	18.332	0.04 B/B TRANSITION
101	264000	1300.0	.2821	89.72	3055.0	67.591	.99352	4.8010	.66841	10671.	2.35929	57.181	18.318	0.04 B/B TRANSITION

Total pressure drop of multiphase flow due + 1300ft feet elevation is 479.63psi

Single phase black oil at -1300 feet of elevation

	Dist.	Elev.	Horiz. Angle	Vert. Devn.	Pres.	Temp.	Mean Vel.	Pressure Drop (psi)		Liquid Flow	Free Gas	Densities (lb/ft3)		Slug Number	Flow Pattern
	(feet)	(feet)	(deg)	(deg)	(psia)	(F)	(ft/s)	Elev.	Frictn.	(bbl/d)	(mmscfd)	Liquid	Gas	(PI-SS)	
FLOWLINE	Flowline_1														
1	0.0000	0.0000	-.282	89.72	1500.0	68.000	2.0634	0.0000	0.0000	24938.	0.00000	37.041	1.0e-6		LIQUID
2	2640.0	-13.00	-.282	89.72	1502.7	68.017	2.0633	-3.344	.63575	24937.	0.00000	37.043	1.0e-6	Huge	LIQUID
3	5280.0	-26.00	-.282	89.72	1505.4	68.034	2.0631	-3.344	.63572	24935.	0.00000	37.045	1.0e-6	Huge	LIQUID
4	7920.0	-39.00	-.282	89.72	1508.1	68.051	2.0630	-3.344	.63570	24934.	0.00000	37.048	1.0e-6	Huge	LIQUID
5	10560.	-52.00	-.282	89.72	1510.8	68.068	2.0629	-3.345	.63568	24932.	0.00000	37.050	1.0e-6	Huge	LIQUID
6	13200.	-65.00	-.282	89.72	1513.5	68.085	2.0628	-3.345	.63566	24931.	0.00000	37.052	1.0e-6	Huge	LIQUID
7	15840.	-78.00	-.282	89.72	1516.3	68.102	2.0627	-3.345	.63563	24930.	0.00000	37.054	1.0e-6	Huge	LIQUID
8	18480.	-91.00	-.282	89.72	1519.0	68.119	2.0626	-3.345	.63561	24928.	0.00000	37.056	1.0e-6	Huge	LIQUID
9	21120.	-104.0	-.282	89.72	1521.7	68.136	2.0624	-3.345	.63559	24927.	0.00000	37.058	1.0e-6	Huge	LIQUID
10	23760.	-117.0	-.282	89.72	1524.4	68.153	2.0623	-3.346	.63556	24925.	0.00000	37.060	1.0e-6	Huge	LIQUID
11	26400.	-130.0	-.282	89.72	1527.1	68.170	2.0622	-3.346	.63554	24924.	0.00000	37.062	1.0e-6	Huge	LIQUID
12	29040.	-143.0	-.282	89.72	1529.8	68.187	2.0621	-3.346	.63552	24923.	0.00000	37.064	1.0e-6	Huge	LIQUID
13	31680.	-156.0	-.282	89.72	1532.5	68.204	2.0620	-3.346	.63550	24921.	0.00000	37.066	1.0e-6	Huge	LIQUID
14	34320.	-169.0	-.282	89.72	1535.2	68.221	2.0619	-3.346	.63547	24920.	0.00000	37.068	1.0e-6	Huge	LIQUID
15	36960.	-182.0	-.282	89.72	1537.9	68.238	2.0617	-3.347	.63545	24918.	0.00000	37.071	1.0e-6	Huge	LIQUID
16	39600.	-195.0	-.282	89.72	1540.6	68.255	2.0616	-3.347	.63543	24917.	0.00000	37.073	1.0e-6	Huge	LIQUID
17	42240.	-208.0	-.282	89.72	1543.4	68.272	2.0615	-3.347	.63540	24916.	0.00000	37.075	1.0e-6	Huge	LIQUID
18	44880.	-221.0	-.282	89.72	1546.1	68.289	2.0614	-3.347	.63538	24914.	0.00000	37.077	1.0e-6	Huge	LIQUID
19	47520.	-234.0	-.282	89.72	1548.8	68.306	2.0613	-3.347	.63536	24913.	0.00000	37.079	1.0e-6	Huge	LIQUID
20	50160.	-247.0	-.282	89.72	1551.5	68.323	2.0612	-3.347	.63534	24911.	0.00000	37.081	1.0e-6	Huge	LIQUID
21	52800.	-260.0	-.282	89.72	1554.2	68.340	2.0610	-3.348	.63531	24910.	0.00000	37.083	1.0e-6	Huge	LIQUID
22	55440.	-273.0	-.282	89.72	1556.9	68.357	2.0609	-3.348	.63529	24909.	0.00000	37.085	1.0e-6	Huge	LIQUID
23	58080.	-286.0	-.282	89.72	1559.6	68.374	2.0608	-3.348	.63527	24907.	0.00000	37.087	1.0e-6	Huge	LIQUID
24	60720.	-299.0	-.282	89.72	1562.3	68.391	2.0607	-3.348	.63524	24906.	0.00000	37.089	1.0e-6	Huge	LIQUID
25	63360.	-312.0	-.282	89.72	1565.1	68.409	2.0606	-3.348	.63522	24904.	0.00000	37.092	1.0e-6	Huge	LIQUID
26	66000.	-325.0	-.282	89.72	1567.8	68.426	2.0605	-3.349	.63520	24903.	0.00000	37.094	1.0e-6	Huge	LIQUID
27	68640.	-338.0	-.282	89.72	1570.5	68.443	2.0603	-3.349	.63517	24902.	0.00000	37.096	1.0e-6	Huge	LIQUID
28	71280.	-351.0	-.282	89.72	1573.2	68.460	2.0602	-3.349	.63515	24900.	0.00000	37.098	1.0e-6	Huge	LIQUID
29	73920.	-364.0	-.282	89.72	1575.9	68.477	2.0601	-3.349	.63513	24899.	0.00000	37.100	1.0e-6	Huge	LIQUID
30	76560.	-377.0	-.282	89.72	1578.6	68.494	2.0600	-3.349	.63511	24897.	0.00000	37.102	1.0e-6	Huge	LIQUID
31	79200.	-390.0	-.282	89.72	1581.3	68.511	2.0599	-3.350	.63508	24896.	0.00000	37.104	1.0e-6	Huge	LIQUID
32	81840.	-403.0	-.282	89.72	1584.1	68.528	2.0598	-3.350	.63506	24894.	0.00000	37.106	1.0e-6	Huge	LIQUID
33	84480.	-416.0	-.282	89.72	1586.8	68.545	2.0596	-3.350	.63504	24893.	0.00000	37.108	1.0e-6	Huge	LIQUID
34	87120.	-429.0	-.282	89.72	1589.5	68.562	2.0595	-3.350	.63501	24892.	0.00000	37.110	1.0e-6	Huge	LIQUID
35	89760.	-442.0	-.282	89.72	1592.2	68.579	2.0594	-3.350	.63499	24890.	0.00000	37.113	1.0e-6	Huge	LIQUID
36	92400.	-455.0	-.282	89.72	1594.9	68.596	2.0593	-3.351	.63497	24889.	0.00000	37.115	1.0e-6	Huge	LIQUID
37	95040.	-468.0	-.282	89.72	1597.6	68.613	2.0592	-3.351	.63494	24887.	0.00000	37.117	1.0e-6	Huge	LIQUID
38	97680.	-481.0	-.282	89.72	1600.3	68.630	2.0591	-3.351	.63492	24886.	0.00000	37.119	1.0e-6	Huge	LIQUID
39	100320	-494.0	-.282	89.72	1603.1	68.648	2.0589	-3.351	.63490	24885.	0.00000	37.121	1.0e-6	Huge	LIQUID
40	102960	-507.0	-.282	89.72	1605.8	68.665	2.0588	-3.351	.63487	24883.	0.00000	37.123	1.0e-6	Huge	LIQUID
41	105600	-520.0	-.282	89.72	1608.5	68.682	2.0587	-3.351	.63485	24882.	0.00000	37.125	1.0e-6	Huge	LIQUID
42	108240	-533.0	-.282	89.72	1611.2	68.699	2.0586	-3.352	.63483	24880.	0.00000	37.127	1.0e-6	Huge	LIQUID
43	110880	-546.0	-.282	89.72	1613.9	68.716	2.0585	-3.352	.63480	24879.	0.00000	37.129	1.0e-6	Huge	LIQUID
44	113520	-559.0	-.282	89.72	1616.6	68.733	2.0584	-3.352	.63478	24877.	0.00000	37.132	1.0e-6	Huge	LIQUID
45	116160	-572.0	-.282	89.72	1619.4	68.750	2.0582	-3.352	.63476	24876.	0.00000	37.134	1.0e-6	Huge	LIQUID
46	118800	-585.0	-.282	89.72	1622.1	68.767	2.0581	-3.352	.63473	24875.	0.00000	37.136	1.0e-6	Huge	LIQUID
47	121440	-598.0	-.282	89.72	1624.8	68.784	2.0580	-3.353	.63471	24873.	0.00000	37.138	1.0e-6	Huge	LIQUID
48	124080	-611.0	-.282	89.72	1627.5	68.802	2.0579	-3.353	.63469	24872.	0.00000	37.140	1.0e-6	Huge	LIQUID
49	126720	-624.0	-.282	89.72	1630.2	68.819	2.0578	-3.353	.63466	24870.	0.00000	37.142	1.0e-6	Huge	LIQUID
50	129360	-637.0	-.282	89.72	1633.0	68.836	2.0577	-3.353	.63464	24869.	0.00000	37.144	1.0e-6	Huge	LIQUID
51	132000	-650.0	-.282	89.72	1635.7	68.853	2.0575	-3.353	.63462	24868.	0.00000	37.146	1.0e-6	Huge	LIQUID
52	134640	-663.0	-.282	89.72	1638.4	68.870	2.0574	-3.354	.63459	24866.	0.00000	37.149	1.0e-6	Huge	LIQUID
53	137280	-676.0	-.282	89.72	1641.1	68.887	2.0573	-3.354	.63457	24865.	0.00000	37.151	1.0e-6	Huge	LIQUID
54	139920	-689.0	-.282	89.72	1643.8	68.904	2.0572	-3.354	.63455	24863.	0.00000	37.153	1.0e-6	Huge	LIQUID
55	142560	-702.0	-.282	89.72	1646.5	68.921	2.0571	-3.354	.63452	24862.	0.00000	37.155	1.0e-6	Huge	LIQUID
56	145200	-715.0	-.282	89.72	1649.3	68.939	2.0569	-3.354	.63450	24860.	0.00000	37.157	1.0e-6	Huge	LIQUID
57	147840	-728.0	-.282	89.72	1652.0	68.956	2.0568	-3.355	.63448	24859.	0.00000	37.159	1.0e-6	Huge	LIQUID
58	150480	-741.0	-.282	89.72	1654.7	68.973	2.0567	-3.355	.63445	24858.	0.00000	37.161	1.0e-6	Huge	LIQUID
59	153120	-754.0	-.282	89.72	1657.4	68.990	2.0566	-3.355	.63443	24856.	0.00000	37.163	1.0e-6	Huge	LIQUID
60	155760	-767.0	-.282	89.72	1660.2	69.007	2.0565	-3.355	.63441	24855.	0.00000	37.166	1.0e-6	Huge	LIQUID
61	158400	-780.0	-.282	89.72	1662.9	69.024	2.0564	-3.355	.63438	24853.	0.00000	37.168	1.0e-6	Huge	LIQUID
62	161040	-793.0	-.282	89.72	1665.6	69.041	2.0562	-3.356	.63436	24852.	0.00000	37.170	1.0e-6	Huge	LIQUID
63	163680	-806.0	-.282	89.72	1668.3	69.059	2.0561	-3.356	.63434	24851.	0.00000	37.172	1.0e-6	Huge	LIQUID
64	166320	-819.0	-.282	89.72	1671.0	69.076	2.0560	-3.356	.63431	24849.	0.00000	37.174	1.0e-6	Huge	LIQUID
65	168960	-832.0	-.282	89.72	1673.8	69.093	2.0559	-3.356	.63429	24848.	0.00000	37.176	1.0e-6	Huge	LIQUID
66	171600	-845.0	-.282	89.72	1676.5	69.110	2.0558	-3.356	.63427	24846.	0.00000	37.178	1.0e-6	Huge	LIQUID
67	174240	-858.0	-.282	89.72	1679.2	69.127	2.0557	-3.356	.63424	24845.	0.00000	37.180	1.0e-6	Huge	LIQUID
68	176880	-871.0	-.282	89.72	1681.9	69.144	2.0555	-3.357	.63422	24843.	0.00000	37.183	1.0e-6	Huge	LIQUID
69	179520	-884.0	-.282	89.72	1684.6	69.162	2.0554	-3.357	.63420	24842.	0.00000	37.185	1.0e-6	Huge	LIQUID
70	182160	-897.0	-.282	89.72	1687.4	69.179	2.0553	-3.357	.63417	24841.	0.00000	37.187	1.0e-6	Huge	LIQUID
71	184800	-910.0	-.282	89.72	1690.1	69.196	2.0552	-3.357	.63415	24839.	0.00000	37.189	1.0e-6	Huge	LIQUID
72	187440	-923.0	-.282	89.72	1692.8	69.213	2.0551	-3.357	.63412	24838.	0.00000	37.191	1.0e-6	Huge	LIQUID
73	190080	-936.0	-.282	89.72	1695.5	69.230	2.0549	-3.358	.63410	24836.	0.00000	37.193	1.0e-6	Huge	LIQUID
74	192720	-949.0	-.282	89.72	1698.3	69.248	2.0548	-3.358	.63408	24835.	0.00000	37.195	1.0e-6	Huge	LIQUID
75	195360	-962.0	-.282	89.72	1701.0	69.265	2.0547	-3.358	.63405	24833.	0.00000	37.197	1.0e-6	Huge	LIQUID
76	198000	-975.0	-.282	89.72	1703.7	69.282	2.0546	-3.358	.63403	24832.	0.00000	37.200	1.0e-6	Huge	LIQUID
77	200640	-988.0	-.282	89.72	1706.4	69.299	2.0545	-3.358	.63401	24831.	0.00000	37.202	1.0e-6	Huge	LIQUID
78	203280	-1001.	-.282	89.72	1709.2	69.317	2.0544	-3.359	.63398	24829.	0.00000	37.204	1.0e-6	Huge	LIQUID
79	205920	-1014.	-.282	89.72	1711.9	69.334	2.0542	-3.359	.63396	24828.	0.00000	37.206	1.0e-6	Huge	LIQUID
80	208560	-1027.	-.282	89.72	1714.6	69.351	2.0541	-3.359	.63394	24826.	0.00000	37.208	1.0e-6	Huge	LIQUID

81	211200	-1040.	-.282	89.72	1717.3	69.368	2.0540	-3.359	.63391	24825.	0.00000	37.210	1.0e-6	Huge LIQUID
82	213840	-1053.	-.282	89.72	1720.1	69.385	2.0539	-3.359	.63389	24823.	0.00000	37.212	1.0e-6	Huge LIQUID
83	216480	-1066.	-.282	89.72	1722.8	69.403	2.0538	-3.360	.63386	24822.	0.00000	37.215	1.0e-6	Huge LIQUID
84	219120	-1079.	-.282	89.72	1725.5	69.420	2.0536	-3.360	.63384	24821.	0.00000	37.217	1.0e-6	Huge LIQUID
85	221760	-1092.	-.282	89.72	1728.2	69.437	2.0535	-3.360	.63382	24819.	0.00000	37.219	1.0e-6	Huge LIQUID
86	224400	-1105.	-.282	89.72	1731.0	69.454	2.0534	-3.360	.63379	24818.	0.00000	37.221	1.0e-6	Huge LIQUID
87	227040	-1118.	-.282	89.72	1733.7	69.471	2.0533	-3.360	.63377	24816.	0.00000	37.223	1.0e-6	Huge LIQUID
88	229680	-1131.	-.282	89.72	1736.4	69.489	2.0532	-3.361	.63375	24815.	0.00000	37.225	1.0e-6	Huge LIQUID
89	232320	-1144.	-.282	89.72	1739.1	69.506	2.0531	-3.361	.63372	24813.	0.00000	37.227	1.0e-6	Huge LIQUID
90	234960	-1157.	-.282	89.72	1741.9	69.523	2.0529	-3.361	.63370	24812.	0.00000	37.230	1.0e-6	Huge LIQUID
91	237600	-1170.	-.282	89.72	1744.6	69.540	2.0528	-3.361	.63367	24811.	0.00000	37.232	1.0e-6	Huge LIQUID
92	240240	-1183.	-.282	89.72	1747.3	69.558	2.0527	-3.361	.63365	24809.	0.00000	37.234	1.0e-6	Huge LIQUID
93	242880	-1196.	-.282	89.72	1750.1	69.575	2.0526	-3.361	.63363	24808.	0.00000	37.236	1.0e-6	Huge LIQUID
94	245520	-1209.	-.282	89.72	1752.8	69.592	2.0525	-3.362	.63360	24806.	0.00000	37.238	1.0e-6	Huge LIQUID
95	248160	-1222.	-.282	89.72	1755.5	69.609	2.0523	-3.362	.63358	24805.	0.00000	37.240	1.0e-6	Huge LIQUID
96	250800	-1235.	-.282	89.72	1758.2	69.627	2.0522	-3.362	.63355	24803.	0.00000	37.242	1.0e-6	Huge LIQUID
97	253440	-1248.	-.282	89.72	1761.0	69.644	2.0521	-3.362	.63353	24802.	0.00000	37.245	1.0e-6	Huge LIQUID
98	256080	-1261.	-.282	89.72	1763.7	69.661	2.0520	-3.362	.63351	24801.	0.00000	37.247	1.0e-6	Huge LIQUID
99	258720	-1274.	-.282	89.72	1766.4	69.678	2.0519	-3.363	.63348	24799.	0.00000	37.249	1.0e-6	Huge LIQUID
100	261360	-1287.	-.282	89.72	1769.2	69.696	2.0518	-3.363	.63346	24798.	0.00000	37.251	1.0e-6	Huge LIQUID
101	264000	-1300.	-.282	89.72	1771.9	69.713	2.0516	-3.363	.63344	24796.	0.00000	37.253	1.0e-6	Huge LIQUID

Total pressure increase of black oil flow due to – 1300 feet elevation is 301.4 psi

Single phase gas at -1300 feet of elevation

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE Flowline_1															
1	0.0000	0.0000	-.282	89.72	2500.0	68.000	2.9887	0.0000	0.0000	0.0000	26.0000	.00010	11.778		GAS
2	2640.0	-13.00	-.282	89.72	2500.4	68.034	2.9886	-1.063	.62660	0.0000	26.0000	.00010	11.778	Huge	GAS
3	5280.0	-26.00	-.282	89.72	2500.9	68.069	2.9885	-1.063	.62658	0.0000	26.0000	.00010	11.778	Huge	GAS
4	7920.0	-39.00	-.282	89.72	2501.3	68.103	2.9884	-1.063	.62656	0.0000	26.0000	.00010	11.779	Huge	GAS
5	10560.	-52.00	-.282	89.72	2501.7	68.137	2.9883	-1.063	.62654	0.0000	26.0000	.00010	11.779	Huge	GAS
6	13200.	-65.00	-.282	89.72	2502.2	68.171	2.9882	-1.063	.62652	0.0000	26.0000	.00010	11.779	Huge	GAS
7	15840.	-78.00	-.282	89.72	2502.6	68.206	2.9881	-1.063	.62650	0.0000	26.0000	.00010	11.780	Huge	GAS
8	18480.	-91.00	-.282	89.72	2503.1	68.240	2.9880	-1.063	.62649	0.0000	26.0000	.00010	11.780	Huge	GAS
9	21120.	-104.0	-.282	89.72	2503.5	68.274	2.9879	-1.064	.62647	0.0000	26.0000	.00010	11.781	Huge	GAS
10	23760.	-117.0	-.282	89.72	2503.9	68.308	2.9878	-1.064	.62645	0.0000	26.0000	.00010	11.781	Huge	GAS
11	26400.	-130.0	-.282	89.72	2504.4	68.343	2.9877	-1.064	.62643	0.0000	26.0000	.00010	11.781	Huge	GAS
12	29040.	-143.0	-.282	89.72	2504.8	68.377	2.9877	-1.064	.62641	0.0000	26.0000	.00010	11.782	Huge	GAS
13	31680.	-156.0	-.282	89.72	2505.2	68.411	2.9876	-1.064	.62639	0.0000	26.0000	.00010	11.782	Huge	GAS
14	34320.	-169.0	-.282	89.72	2505.7	68.446	2.9875	-1.064	.62637	0.0000	26.0000	.00010	11.782	Huge	GAS
15	36960.	-182.0	-.282	89.72	2506.1	68.480	2.9874	-1.064	.62635	0.0000	26.0000	.00010	11.783	Huge	GAS
16	39600.	-195.0	-.282	89.72	2506.6	68.514	2.9873	-1.064	.62634	0.0000	26.0000	.00010	11.783	Huge	GAS
17	42240.	-208.0	-.282	89.72	2507.0	68.549	2.9872	-1.064	.62632	0.0000	26.0000	.00010	11.783	Huge	GAS
18	44880.	-221.0	-.282	89.72	2507.4	68.583	2.9871	-1.064	.62630	0.0000	26.0000	.00010	11.784	Huge	GAS
19	47520.	-234.0	-.282	89.72	2507.9	68.617	2.9870	-1.064	.62628	0.0000	26.0000	.00010	11.784	Huge	GAS
20	50160.	-247.0	-.282	89.72	2508.3	68.652	2.9869	-1.064	.62626	0.0000	26.0000	.00010	11.785	Huge	GAS
21	52800.	-260.0	-.282	89.72	2508.7	68.686	2.9868	-1.064	.62624	0.0000	26.0000	.00010	11.785	Huge	GAS
22	55440.	-273.0	-.282	89.72	2509.2	68.720	2.9867	-1.064	.62622	0.0000	26.0000	.00010	11.785	Huge	GAS
23	58080.	-286.0	-.282	89.72	2509.6	68.755	2.9866	-1.064	.62620	0.0000	26.0000	.00010	11.786	Huge	GAS
24	60720.	-299.0	-.282	89.72	2510.1	68.789	2.9865	-1.064	.62619	0.0000	26.0000	.00010	11.786	Huge	GAS
25	63360.	-312.0	-.282	89.72	2510.5	68.823	2.9865	-1.064	.62617	0.0000	26.0000	.00010	11.786	Huge	GAS
26	66000.	-325.0	-.282	89.72	2510.9	68.857	2.9864	-1.064	.62615	0.0000	26.0000	.00010	11.787	Huge	GAS
27	68640.	-338.0	-.282	89.72	2511.4	68.892	2.9863	-1.064	.62613	0.0000	26.0000	.00010	11.787	Huge	GAS
28	71280.	-351.0	-.282	89.72	2511.8	68.926	2.9862	-1.064	.62611	0.0000	26.0000	.00010	11.787	Huge	GAS
29	73920.	-364.0	-.282	89.72	2512.3	68.960	2.9861	-1.064	.62609	0.0000	26.0000	.00010	11.788	Huge	GAS
30	76560.	-377.0	-.282	89.72	2512.7	68.995	2.9860	-1.064	.62607	0.0000	26.0000	.00010	11.788	Huge	GAS
31	79200.	-390.0	-.282	89.72	2513.1	69.029	2.9859	-1.064	.62606	0.0000	26.0000	.00010	11.789	Huge	GAS
32	81840.	-403.0	-.282	89.72	2513.6	69.063	2.9858	-1.064	.62604	0.0000	26.0000	.00010	11.789	Huge	GAS
33	84480.	-416.0	-.282	89.72	2514.0	69.098	2.9857	-1.064	.62602	0.0000	26.0000	.00010	11.789	Huge	GAS
34	87120.	-429.0	-.282	89.72	2514.4	69.132	2.9856	-1.064	.62600	0.0000	26.0000	.00010	11.790	Huge	GAS
35	89760.	-442.0	-.282	89.72	2514.9	69.166	2.9855	-1.064	.62598	0.0000	26.0000	.00010	11.790	Huge	GAS
36	92400.	-455.0	-.282	89.72	2515.3	69.201	2.9854	-1.064	.62596	0.0000	26.0000	.00010	11.790	Huge	GAS
37	95040.	-468.0	-.282	89.72	2515.8	69.235	2.9854	-1.064	.62594	0.0000	26.0000	.00010	11.791	Huge	GAS
38	97680.	-481.0	-.282	89.72	2516.2	69.269	2.9853	-1.064	.62592	0.0000	26.0000	.00010	11.791	Huge	GAS
39	100320	-494.0	-.282	89.72	2516.6	69.304	2.9852	-1.064	.62591	0.0000	26.0000	.00010	11.791	Huge	GAS
40	102960	-507.0	-.282	89.72	2517.1	69.338	2.9851	-1.065	.62589	0.0000	26.0000	.00010	11.792	Huge	GAS
41	105600	-520.0	-.282	89.72	2517.5	69.372	2.9850	-1.065	.62587	0.0000	26.0000	.00010	11.792	Huge	GAS
42	108240	-533.0	-.282	89.72	2518.0	69.407	2.9849	-1.065	.62585	0.0000	26.0000	.00010	11.793	Huge	GAS
43	110880	-546.0	-.282	89.72	2518.4	69.441	2.9848	-1.065	.62583	0.0000	26.0000	.00010	11.793	Huge	GAS
44	113520	-559.0	-.282	89.72	2518.8	69.475	2.9847	-1.065	.62581	0.0000	26.0000	.00010	11.793	Huge	GAS
45	116160	-572.0	-.282	89.72	2519.3	69.510	2.9846	-1.065	.62580	0.0000	26.0000	.00010	11.794	Huge	GAS
46	118800	-585.0	-.282	89.72	2519.7	69.544	2.9845	-1.065	.62578	0.0000	26.0000	.00010	11.794	Huge	GAS
47	121440	-598.0	-.282	89.72	2520.1	69.578	2.9844	-1.065	.62576	0.0000	26.0000	.00010	11.794	Huge	GAS
48	124080	-611.0	-.282	89.72	2520.6	69.613	2.9844	-1.065	.62574	0.0000	26.0000	.00010	11.795	Huge	GAS
49	126720	-624.0	-.282	89.72	2521.0	69.647	2.9843	-1.065	.62572	0.0000	26.0000	.00010	11.795	Huge	GAS
50	129360	-637.0	-.282	89.72	2521.5	69.681	2.9842	-1.065	.62570	0.0000	26.0000	.00010	11.795	Huge	GAS
51	132000	-650.0	-.282	89.72	2521.9	69.716	2.9841	-1.065	.62568	0.0000	26.0000	.00010	11.796	Huge	GAS
52	134640	-663.0	-.282	89.72	2522.3	69.750	2.9840	-1.065	.62567	0.0000	26.0000	.00010	11.796	Huge	GAS
53	137280	-676.0	-.282	89.72	2522.8	69.784	2.9839	-1.065	.62565	0.0000	26.0000	.00010	11.796	Huge	GAS
54	139920	-689.0	-.282	89.72	2523.2	69.819	2.9838	-1.065	.62563	0.0000	26.0000	.00010	11.797	Huge	GAS
55	142560	-702.0	-.282	89.72	2523.7	69.853	2.9837	-1.065	.62561	0.0000	26.0000	.00010	11.797	Huge	GAS
56	145200	-715.0	-.282	89.72	2524.1	69.888	2.9836	-1.065	.62559	0.0000	26.0000	.00010	11.798	Huge	GAS
57	147840	-728.0	-.282	89.72	2524.5	69.922	2.9835	-1.065	.62557	0.0000	26.0000	.00010	11.798	Huge	GAS
58	150480	-741.0	-.282	89.72	2525.0	69.956	2.9834	-1.065	.62556	0.0000	26.0000	.00010	11.798	Huge	GAS
59	153120	-754.0	-.282	89.72	2525.4	69.991	2.9834	-1.065	.62554	0.0000	26.0000	.00010	11.799	Huge	GAS
60	155760	-767.0	-.282	89.72	2525.9	70.025	2.9833	-1.065	.62552	0.0000	26.0000	.00010	11.799	Huge	GAS
61	158400	-780.0	-.282	89.72	2526.3	70.059	2.9832	-1.065	.62550	0.0000	26.0000	.00010	11.799	Huge	GAS
62	161040	-793.0	-.282	89.72	2526.7	70.094	2.9831	-1.065	.62548	0.0000	26.0000	.00010	11.800	Huge	GAS
63	163680	-806.0	-.282	89.72	2527.2	70.128	2.9830	-1.065	.62546	0.0000	26.0000	.00010	11.800	Huge	GAS
64	166320	-819.0	-.282	89.72	2527.6	70.162	2.9829	-1.065	.62545	0.0000	26.0000	.00010	11.800	Huge	GAS
65	168960	-832.0	-.282	89.72	2528.1	70.197	2.9828	-1.065	.62543	0.0000	26.0000	.00010	11.801	Huge	GAS
66	171600	-845.0	-.282	89.72	2528.5	70.231	2.9827	-1.065	.62541	0.0000	26.0000	.00010	11.801	Huge	GAS
67	174240	-858.0	-.282	89.72	2528.9	70.266	2.9826	-1.065	.62539	0.0000	26.0000	.00010	11.801	Huge	GAS
68	176880	-871.0	-.282	89.72	2529.4	70.300	2.9825	-1.065	.62537	0.0000	26.0000	.00010	11.802	Huge	GAS
69	179520	-884.0	-.282	89.72	2529.8	70.334	2.9825	-1.065	.62535	0.0000	26.0000	.00010	11.802	Huge	GAS
70	182160	-897.0	-.282	89.72	2530.3	70.369	2.9824	-1.065	.62534	0.0000	26.0000	.00010	11.803	Huge	GAS
71	184800	-910.0	-.282	89.72	2530.7	70.403	2.9823	-1.066	.62532	0.0000	26.0000	.00010	11.803	Huge	GAS
72	187440	-923.0	-.282	89.72	2531.1	70.437	2.9822	-1.066	.62530	0.0000	26.0000	.00010	11.803	Huge	GAS
73	190080	-936.0	-.282	89.72	2531.6	70.472	2.9821	-1.066	.62528	0.0000	26.0000	.00010	11.804	Huge	GAS
74	192720	-949.0	-.282	89.72	2532.0	70.506	2.9820	-1.066	.62526	0.0000	26.0000	.00010	11.804	Huge	GAS
75	195360	-962.0	-.282	89.72	2532.5	70.540	2.9819	-1.066	.62524	0.0000	26.0000	.00010	11.804	Huge	GAS
76	198000	-975.0	-.282	89.72	2532.9	70.575	2.9818	-1.066	.62523	0.0000	26.0000	.00010	11.805	Huge	GAS
77	200640	-988.0	-.282	89.72	2533.3	70.609	2.9817	-1.066	.62521	0.0000	26.0000	.00010	11.805	Huge	GAS
78	203280	-1001.	-.282	89.72	2533.8	70.644	2.9816	-1.066	.62519	0.0000	26.0000	.00010	11.805	Huge	GAS
79	205920	-1014.	-.282	89.72	2534.2	70.678	2.9816	-1.066	.62517	0.0000	26.0000	.00010	11.806	Huge	GAS
80	208560	-1027.	-.282	89.72	2534.7	70.712	2.9815	-1.066	.62515	0.0000	26.0000	.00010	11.806	Huge	GAS

81	211200	-1040.	-.282	89.72	2535.1	70.747	2.9814	-1.066	.62513	0.0000	26.0000	.00010	11.806	Huge GAS
82	213840	-1053.	-.282	89.72	2535.6	70.781	2.9813	-1.066	.62512	0.0000	26.0000	.00010	11.807	Huge GAS
83	216480	-1066.	-.282	89.72	2536.0	70.816	2.9812	-1.066	.62510	0.0000	26.0000	.00010	11.807	Huge GAS
84	219120	-1079.	-.282	89.72	2536.4	70.850	2.9811	-1.066	.62508	0.0000	26.0000	.00010	11.808	Huge GAS
85	221760	-1092.	-.282	89.72	2536.9	70.884	2.9810	-1.066	.62506	0.0000	26.0000	.00010	11.808	Huge GAS
86	224400	-1105.	-.282	89.72	2537.3	70.919	2.9809	-1.066	.62504	0.0000	26.0000	.00010	11.808	Huge GAS
87	227040	-1118.	-.282	89.72	2537.8	70.953	2.9808	-1.066	.62503	0.0000	26.0000	.00010	11.809	Huge GAS
88	229680	-1131.	-.282	89.72	2538.2	70.988	2.9808	-1.066	.62501	0.0000	26.0000	.00010	11.809	Huge GAS
89	232320	-1144.	-.282	89.72	2538.6	71.022	2.9807	-1.066	.62499	0.0000	26.0000	.00010	11.809	Huge GAS
90	234960	-1157.	-.282	89.72	2539.1	71.056	2.9806	-1.066	.62497	0.0000	26.0000	.00010	11.810	Huge GAS
91	237600	-1170.	-.282	89.72	2539.5	71.091	2.9805	-1.066	.62495	0.0000	26.0000	.00010	11.810	Huge GAS
92	240240	-1183.	-.282	89.72	2540.0	71.125	2.9804	-1.066	.62494	0.0000	26.0000	.00010	11.810	Huge GAS
93	242880	-1196.	-.282	89.72	2540.4	71.160	2.9803	-1.066	.62492	0.0000	26.0000	.00010	11.811	Huge GAS
94	245520	-1209.	-.282	89.72	2540.8	71.194	2.9802	-1.066	.62490	0.0000	26.0000	.00010	11.811	Huge GAS
95	248160	-1222.	-.282	89.72	2541.3	71.228	2.9801	-1.066	.62488	0.0000	26.0000	.00010	11.811	Huge GAS
96	250800	-1235.	-.282	89.72	2541.7	71.263	2.9800	-1.066	.62486	0.0000	26.0000	.00010	11.812	Huge GAS
97	253440	-1248.	-.282	89.72	2542.2	71.297	2.9800	-1.066	.62485	0.0000	26.0000	.00010	11.812	Huge GAS
98	256080	-1261.	-.282	89.72	2542.6	71.332	2.9799	-1.066	.62483	0.0000	26.0000	.00010	11.812	Huge GAS
99	258720	-1274.	-.282	89.72	2543.1	71.366	2.9798	-1.066	.62481	0.0000	26.0000	.00010	11.813	Huge GAS
100	261360	-1287.	-.282	89.72	2543.5	71.401	2.9797	-1.066	.62479	0.0000	26.0000	.00010	11.813	Huge GAS
101	264000	-1300.	-.282	89.72	2543.9	71.435	2.9796	-1.066	.62477	0.0000	26.0000	.00010	11.813	Huge GAS

Total pressure increase of single phase gas flow due to - 1300ft feet elevation is 106.6 psi

Multiphase flow at -1300 feet of elevation

	Dist. (feet)	Elev. (feet)	Horiz. Angle (deg)	Vert. Devn. (deg)	Pres. (psia)	Temp. (F)	Mean Vel. (ft/s)	Pressure Drop (psi) Elev.	Frictn.	Liquid Flow (bbl/d)	Free Gas (mmscfd)	Densities (lb/ft3) Liquid	Gas	Slug Number (PI-SS)	Flow Pattern
FLOWLINE	Flowline_2														
1	0.0000	0.0000	-.282	89.72	3600.0	68.000	.98282	0.0000	0.0000	10834.	2.00257	56.687	19.541		B/B TRANSITION
2	2640.0	-13.00	-.282	89.72	3603.2	68.014	.98278	-4.000	.76736	10835.	2.00048	56.684	19.547	1.10	B/B TRANSITION
3	5280.0	-26.00	-.282	89.72	3606.5	68.027	.98273	-4.000	.76707	10836.	1.99838	56.681	19.553	0.55	B/B TRANSITION
4	7920.0	-39.00	-.282	89.72	3609.7	68.040	.98269	-4.000	.76678	10837.	1.99629	56.678	19.559	0.37	B/B TRANSITION
5	10560.	-52.00	-.282	89.72	3612.9	68.053	.98264	-4.000	.76649	10838.	1.99419	56.675	19.565	0.27	B/B TRANSITION
6	13200.	-65.00	-.282	89.72	3616.2	68.066	.98260	-4.000	.76620	10839.	1.99209	56.672	19.571	0.22	B/B TRANSITION
7	15840.	-78.00	-.282	89.72	3619.4	68.078	.98256	-4.000	.76591	10840.	1.98999	56.669	19.577	0.18	B/B TRANSITION
8	18480.	-91.00	-.282	89.72	3622.6	68.091	.98251	-4.000	.76562	10841.	1.98789	56.665	19.584	0.16	B/B TRANSITION
9	21120.	-104.0	-.282	89.72	3625.9	68.103	.98247	-4.000	.76533	10842.	1.98578	56.662	19.590	0.14	B/B TRANSITION
10	23760.	-117.0	-.282	89.72	3629.1	68.114	.98242	-4.000	.76504	10843.	1.98368	56.659	19.596	0.12	B/B TRANSITION
11	26400.	-130.0	-.282	89.72	3632.3	68.126	.98238	-4.000	.76475	10844.	1.98157	56.656	19.602	0.11	B/B TRANSITION
12	29040.	-143.0	-.282	89.72	3635.6	68.137	.98234	-4.000	.76446	10845.	1.97946	56.653	19.608	0.10	B/B TRANSITION
13	31680.	-156.0	-.282	89.72	3638.8	68.148	.98229	-4.001	.76417	10846.	1.97735	56.650	19.614	0.09	B/B TRANSITION
14	34320.	-169.0	-.282	89.72	3642.0	68.159	.98225	-4.001	.76388	10847.	1.97524	56.647	19.620	0.08	B/B TRANSITION
15	36960.	-182.0	-.282	89.72	3645.3	68.170	.98220	-4.001	.76359	10848.	1.97313	56.644	19.626	0.08	B/B TRANSITION
16	39600.	-195.0	-.282	89.72	3648.5	68.181	.98216	-4.001	.76330	10849.	1.97102	56.640	19.632	0.07	B/B TRANSITION
17	42240.	-208.0	-.282	89.72	3651.8	68.191	.98212	-4.001	.76301	10850.	1.96890	56.637	19.638	0.07	B/B TRANSITION
18	44880.	-221.0	-.282	89.72	3655.0	68.201	.98207	-4.001	.76272	10851.	1.96678	56.634	19.645	0.06	B/B TRANSITION
19	47520.	-234.0	-.282	89.72	3658.2	68.211	.98203	-4.001	.76243	10852.	1.96466	56.631	19.651	0.06	B/B TRANSITION
20	50160.	-247.0	-.282	89.72	3661.5	68.221	.98198	-4.001	.76214	10853.	1.96254	56.628	19.657	0.06	B/B TRANSITION
21	52800.	-260.0	-.282	89.72	3664.7	68.231	.98194	-4.001	.76185	10854.	1.96041	56.625	19.663	0.05	B/B TRANSITION
22	55440.	-273.0	-.282	89.72	3668.0	68.240	.98190	-4.001	.76157	10855.	1.95829	56.622	19.669	0.05	B/B TRANSITION
23	58080.	-286.0	-.282	89.72	3671.2	68.250	.98185	-4.001	.76128	10856.	1.95617	56.619	19.675	0.05	B/B TRANSITION
24	60720.	-299.0	-.282	89.72	3674.4	68.259	.98181	-4.001	.76099	10858.	1.95404	56.615	19.681	0.05	B/B TRANSITION
25	63360.	-312.0	-.282	89.72	3677.7	68.268	.98176	-4.001	.76070	10859.	1.95192	56.612	19.688	0.05	B/B TRANSITION
26	66000.	-325.0	-.282	89.72	3680.9	68.277	.98172	-4.001	.76041	10860.	1.94978	56.609	19.694	0.04	B/B TRANSITION
27	68640.	-338.0	-.282	89.72	3684.2	68.285	.98168	-4.001	.76012	10861.	1.94766	56.606	19.700	0.04	B/B TRANSITION
28	71280.	-351.0	-.282	89.72	3687.4	68.294	.98163	-4.002	.75984	10862.	1.94553	56.603	19.706	0.04	B/B TRANSITION
29	73920.	-364.0	-.282	89.72	3690.6	68.302	.98159	-4.002	.75955	10863.	1.94339	56.600	19.712	0.04	B/B TRANSITION
30	76560.	-377.0	-.282	89.72	3693.9	68.310	.98154	-4.002	.75926	10864.	1.94125	56.597	19.718	0.04	B/B TRANSITION
31	79200.	-390.0	-.282	89.72	3697.1	68.318	.98150	-4.002	.75897	10865.	1.93912	56.594	19.725	0.04	B/B TRANSITION
32	81840.	-403.0	-.282	89.72	3700.4	68.326	.98146	-4.002	.75868	10866.	1.93698	56.591	19.731	0.03	B/B TRANSITION
33	84480.	-416.0	-.282	89.72	3703.6	68.334	.98141	-4.002	.75840	10867.	1.93485	56.587	19.737	0.03	B/B TRANSITION
34	87120.	-429.0	-.282	89.72	3706.9	68.342	.98137	-4.002	.75811	10868.	1.93271	56.584	19.743	0.03	B/B TRANSITION
35	89760.	-442.0	-.282	89.72	3710.1	68.349	.98133	-4.002	.75782	10869.	1.93056	56.581	19.749	0.03	B/B TRANSITION
36	92400.	-455.0	-.282	89.72	3713.3	68.356	.98128	-4.002	.75754	10870.	1.92842	56.578	19.755	0.03	B/B TRANSITION
37	95040.	-468.0	-.282	89.72	3716.6	68.364	.98124	-4.002	.75725	10871.	1.92628	56.575	19.762	0.03	B/B TRANSITION
38	97680.	-481.0	-.282	89.72	3719.8	68.371	.98120	-4.002	.75696	10872.	1.92413	56.572	19.768	0.03	B/B TRANSITION
39	100320	-494.0	-.282	89.72	3723.1	68.378	.98115	-4.002	.75668	10873.	1.92198	56.569	19.774	0.03	B/B TRANSITION
40	102960	-507.0	-.282	89.72	3726.3	68.384	.98111	-4.002	.75639	10874.	1.91984	56.566	19.780	0.03	B/B TRANSITION
41	105600	-520.0	-.282	89.72	3729.6	68.391	.98106	-4.003	.75611	10875.	1.91769	56.563	19.786	0.03	B/B TRANSITION
42	108240	-533.0	-.282	89.72	3732.8	68.398	.98102	-4.003	.75582	10876.	1.91554	56.559	19.792	0.03	B/B TRANSITION
43	110880	-546.0	-.282	89.72	3736.1	68.405	.98098	-4.003	.75554	10877.	1.91339	56.556	19.799	0.03	B/B TRANSITION
44	113520	-559.0	-.282	89.72	3739.3	68.411	.98094	-4.003	.75525	10878.	1.91124	56.553	19.805	0.02	B/B TRANSITION
45	116160	-572.0	-.282	89.72	3742.6	68.417	.98089	-4.003	.75496	10879.	1.90909	56.550	19.811	0.02	B/B TRANSITION
46	118800	-585.0	-.282	89.72	3745.8	68.423	.98085	-4.003	.75468	10880.	1.90693	56.547	19.817	0.02	B/B TRANSITION
47	121440	-598.0	-.282	89.72	3749.1	68.429	.98081	-4.003	.75439	10881.	1.90477	56.544	19.823	0.02	B/B TRANSITION
48	124080	-611.0	-.282	89.72	3752.3	68.435	.98076	-4.003	.75411	10882.	1.90262	56.541	19.829	0.02	B/B TRANSITION
49	126720	-624.0	-.282	89.72	3755.6	68.441	.98072	-4.003	.75383	10883.	1.90046	56.538	19.836	0.02	B/B TRANSITION
50	129360	-637.0	-.282	89.72	3758.8	68.446	.98068	-4.003	.75354	10884.	1.89830	56.535	19.842	0.02	B/B TRANSITION
51	132000	-650.0	-.282	89.72	3762.1	68.452	.98063	-4.003	.75326	10885.	1.89614	56.532	19.848	0.02	B/B TRANSITION
52	134640	-663.0	-.282	89.72	3765.3	68.457	.98059	-4.003	.75297	10886.	1.89398	56.528	19.854	0.02	B/B TRANSITION
53	137280	-676.0	-.282	89.72	3768.6	68.463	.98055	-4.003	.75269	10887.	1.89182	56.525	19.860	0.02	B/B TRANSITION
54	139920	-689.0	-.282	89.72	3771.8	68.468	.98051	-4.003	.75241	10888.	1.88965	56.522	19.866	0.02	B/B TRANSITION
55	142560	-702.0	-.282	89.72	3775.1	68.473	.98046	-4.004	.75212	10889.	1.88749	56.519	19.873	0.02	B/B TRANSITION
56	145200	-715.0	-.282	89.72	3778.3	68.478	.98042	-4.004	.75184	10890.	1.88532	56.516	19.879	0.02	B/B TRANSITION
57	147840	-728.0	-.282	89.72	3781.6	68.483	.98038	-4.004	.75156	10891.	1.88316	56.513	19.885	0.02	B/B TRANSITION
58	150480	-741.0	-.282	89.72	3784.8	68.488	.98033	-4.004	.75127	10892.	1.88099	56.510	19.891	0.02	B/B TRANSITION
59	153120	-754.0	-.282	89.72	3788.1	68.492	.98029	-4.004	.75099	10893.	1.87882	56.507	19.897	0.02	B/B TRANSITION
60	155760	-767.0	-.282	89.72	3791.3	68.497	.98025	-4.004	.75071	10894.	1.87665	56.504	19.903	0.02	B/B TRANSITION
61	158400	-780.0	-.282	89.72	3794.6	68.502	.98021	-4.004	.75043	10895.	1.87448	56.501	19.910	0.02	B/B TRANSITION
62	161040	-793.0	-.282	89.72	3797.8	68.506	.98017	-4.004	.75015	10896.	1.87231	56.497	19.916	0.02	B/B TRANSITION
63	163680	-806.0	-.282	89.72	3801.1	68.509	.98012	-4.004	.74986	10897.	1.87013	56.494	19.922	0.02	B/B TRANSITION
64	166320	-819.0	-.282	89.72	3804.3	68.515	.98008	-4.004	.74958	10898.	1.86796	56.491	19.928	0.02	B/B TRANSITION
65	168960	-832.0	-.282	89.72	3807.6	68.519	.98004	-4.004	.74930	10899.	1.86579	56.488	19.934	0.02	B/B TRANSITION
66	171600	-845.0	-.282	89.72	3810.9	68.523	.98000	-4.004	.74902	10900.	1.86361	56.485	19.940	0.02	B/B TRANSITION
67	174240	-858.0	-.282	89.72	3814.1	68.527	.97996	-4.004	.74874	10901.	1.86143	56.482	19.946	0.02	B/B TRANSITION
68	176880	-871.0	-.282	89.72	3817.4	68.531	.97991	-4.004	.74846	10902.	1.85926	56.479	19.953	0.02	B/B TRANSITION
69	179520	-884.0	-.282	89.72	3820.6	68.535	.97987	-4.005	.74818	10904.	1.85708	56.476	19.959	0.02	B/B TRANSITION
70	182160	-897.0	-.282	89.72	3823.9	68.539	.97983	-4.005	.74790	10905.	1.85490	56.473	19.965	0.02	B/B TRANSITION
71	184800	-910.0	-.282	89.72	3827.1	68.543	.97979	-4.005	.74762	10906.	1.85272	56.470	19.971	0.02	B/B TRANSITION
72	187440	-923.0	-.282	89.72	3830.4	68.546	.97975	-4.005	.74734	10907.	1.85053	56.466	19.977	0.01	B/B TRANSITION
73	190080	-936.0	-.282	89.72	3833.6	68.550	.97970	-4.005	.74706	10908.	1.84835	56.463	19.983	0.01	B/B TRANSITION
74	192720	-949.0	-.282	89.72	3836.9	68.554	.97966	-4.005	.74678	10909.	1.84617	56.460	19.989	0.01	B/B TRANSITION
75	195360	-962.0	-.282	89.72	3840.2	68.557	.97962	-4.005	.74650	10910.	1.84398	56.457	19.996	0.01	B/B TRANSITION
76	198000	-975.0	-.282	89.72	3843.4	68.560	.97958	-4.005	.74622	10911.	1.84180	56.454	20.002	0.01	B/B TRANSITION
77	200640	-988.0	-.282	89.72	3846.7	68.564	.97954	-4.005	.74594	10912.	1.83961	56.451	20.008	0.01	B/B TRANSITION
78	203280	-1001.	-.282	89.72	3849.9	68.567	.97950	-4.005	.74567	10913.	1.83742	56.448	20.014	0.01	B/B TRANSITION
79	205920	-1014.	-.282	89.72	3853.2	68.570	.97946	-4.005	.74539	10914.	1.83523	56.445	20.020	0.01	B/B TRANSITION
80	208560	-1027.	-.282	89.72	3856.5	68.573	.97942	-4.005	.74511	10915.	1.83304	56.442	20.026	0.01	B/B TRANSITION

81	211200	-1040.	-.282	89.72	3859.7	68.576	.97938	-4.005	.74483	10916.	1.83085	56.439	20.032	0.01 B/B TRANSITION
82	213840	-1053.	-.282	89.72	3863.0	68.579	.97933	-4.005	.74456	10917.	1.82866	56.435	20.038	0.01 B/B TRANSITION
83	216480	-1066.	-.282	89.72	3866.2	68.582	.97929	-4.005	.74428	10918.	1.82646	56.432	20.045	0.01 B/B TRANSITION
84	219120	-1079.	-.282	89.72	3869.5	68.585	.97925	-4.006	.74400	10919.	1.82427	56.429	20.051	0.01 B/B TRANSITION
85	221760	-1092.	-.282	89.72	3872.8	68.588	.97921	-4.006	.74372	10920.	1.82208	56.426	20.057	0.01 B/B TRANSITION
86	224400	-1105.	-.282	89.72	3876.0	68.591	.97917	-4.006	.74345	10921.	1.81988	56.423	20.063	0.01 B/B TRANSITION
87	227040	-1118.	-.282	89.72	3879.3	68.593	.97913	-4.006	.74317	10922.	1.81768	56.420	20.069	0.01 B/B TRANSITION
88	229680	-1131.	-.282	89.72	3882.6	68.596	.97909	-4.006	.74290	10923.	1.81549	56.417	20.075	0.01 B/B TRANSITION
89	232320	-1144.	-.282	89.72	3885.8	68.599	.97905	-4.006	.74262	10924.	1.81329	56.414	20.081	0.01 B/B TRANSITION
90	234960	-1157.	-.282	89.72	3889.1	68.601	.97901	-4.006	.74235	10925.	1.81109	56.411	20.087	0.01 B/B TRANSITION
91	237600	-1170.	-.282	89.72	3892.3	68.604	.97897	-4.006	.74207	10926.	1.80889	56.408	20.093	0.01 B/B TRANSITION
92	240240	-1183.	-.282	89.72	3895.6	68.606	.97893	-4.006	.74179	10927.	1.80669	56.404	20.099	0.01 B/B TRANSITION
93	242880	-1196.	-.282	89.72	3898.9	68.609	.97889	-4.006	.74152	10928.	1.80449	56.401	20.106	0.01 B/B TRANSITION
94	245520	-1209.	-.282	89.72	3902.1	68.611	.97885	-4.006	.74125	10929.	1.80229	56.398	20.112	0.01 B/B TRANSITION
95	248160	-1222.	-.282	89.72	3905.4	68.613	.97881	-4.006	.74097	10930.	1.80008	56.395	20.118	0.01 B/B TRANSITION
96	250800	-1235.	-.282	89.72	3908.7	68.614	.97877	-4.006	.74070	10931.	1.79788	56.392	20.124	0.01 B/B TRANSITION
97	253440	-1248.	-.282	89.72	3911.9	68.618	.97873	-4.006	.74042	10932.	1.79567	56.389	20.130	0.01 B/B TRANSITION
98	256080	-1261.	-.282	89.72	3915.2	68.619	.97869	-4.007	.74015	10934.	1.79347	56.386	20.136	0.01 B/B TRANSITION
99	258720	-1274.	-.282	89.72	3918.5	68.621	.97865	-4.007	.73988	10935.	1.79126	56.383	20.142	0.01 B/B TRANSITION
100	261360	-1287.	-.282	89.72	3921.7	68.624	.97861	-4.007	.73960	10936.	1.78905	56.380	20.148	0.01 B/B TRANSITION
101	264000	-1300.	-.282	89.72	3925.0	68.626	.97857	-4.007	.73933	10937.	1.78684	56.376	20.154	0.01 B/B TRANSITION

Total pressure increase of multiphase flow due to - 1300ft feet elevation is 400.4 psi